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A Greater Price for a Greater Good? Evidence that Consumers Pay More for Charity-Linked Products[†]

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To study whether consumers will pay more for products that generate charitable donations, we analyze data from eBay on charity and noncharity auctions of otherwise identical products. Charity prices are 6 percent higher, on average, than noncharity prices. Bids below the closing price are also higher, as are bids by individuals bidding on identical charity and noncharity products. Bidders appear to value charity revenue at least partially as a public good, as they submit bids earlier in charity auctions, stimulating other bidders to bid more aggressively. Our results help explain why firms may pledge charitable donations, green production, or similar activities. (*JEL* D12, D44, D64, L81, M14, M31)

A broad and growing set of for-profit enterprises offer products linked to charitable causes, green production, fair trade practices, and similar activities. Target Corporation, the second largest retailer in the United States, donates 5 percent of its pre-tax profits to charitable groups, as does the Whole Foods Market grocery chain. Starbucks shops serve coffee that is acquired under fair trade standards, and they also offer Ethos bottled water, Starbucks' own brand, which funds contributions to water safety causes. The Gap, Motorola, Apple, Hallmark, and other firms participate in the Product (Red) campaign, selling merchandise that supports relief from AIDS, tuberculosis, and malaria in Africa. Prominent early adopters of charity-oriented marketing efforts include American Express, which in 1983 linked its credit card offers to a campaign to reopen the Statue of Liberty, and Ben & Jerry's Ice Cream, which has historically promoted a variety of environmental and social causes. While many factors may motivate firms and their managers to engage in this behavior, these actions may be driven, in part, by consumers' expressed preference for products offered by socially responsible firms. According to a 1999 survey by Cone/Roper, two-thirds of consumers report that they would favor retailers or brands associated with a good cause, all else equal (Harvey Meyer 1999).

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It is an empirical question whether consumers actually will pay more for charity-linked products. One view is that these products contain an additional favorable attribute, and this should increase demand. An opposing view suggests consumers will not pay more for charity-linked items if their own charitable interests are not aligned with those of the seller. Rather, consumers may prefer to pay competitive prices for noncharity products, and then use some of their remaining budget to support the charities of their choice.[1] Previous research on charity-linked marketing examines this question mainly by employing surveys to investigate whether consumers will state a preference for products produced by socially responsible firms.[2] By contrast, we examine consumer behavior in the marketplace. In particular, we provide evidence that consumers will not merely announce an intention to favor charity-linked products; they pay higher prices in auctions to do so. In the online auction market we investigate, we find that consumers are willing to pay about 6 percent more, on average, when some or all of their payment goes to a charitable cause selected by a seller.[3]

Our paper contributes to the emerging evidence that bundling private products with public goods can intensify consumers' demand for the products and may increase the revenue generated for the public good. In prior theoretical research, Richard Cornes and Todd Sandler (1984) establish that replacing donations with a bundled private and public good can increase the equilibrium level of the public good, while Matthew J. Kotchen (2006) shows that opportunities to purchase "green" products may improve support for the environment relative to situations in which only donations are possible. In theoretical studies of specific market mechanisms, John Morgan (2000) examines lotteries that generate public goods, Jacob K. Goeree et al. (2005) and Maxim Engers and Brian McManus (2007) study equilibrium bidding and revenue in charity auctions, and Mark Bagnoli and Susan G. Watts (2003) consider oligopoly competition and public goods provision when some firms sell products with charity benefits. In related empirical work, Michael J. Hiscox and Nicholas F. B. Smyth (2007) find that consumers' demand for home furnishings increases when consumers are told that the items are produced using fair trade practices. Ramon Casadesus-Masanell et al. (2009) examine a change in production inputs by Patagonia and show that catalogue customers for this firm are willing to pay significantly more for shirts manufactured with organically grown cotton, which yields environmental benefits but is otherwise indistinguishable from conventionally produced cotton. Examining efforts to generate a public good (rather than sell

[1] This argument is closely related to Milton Friedman's (1970) critique of socially responsible business objectives, which he argues should be replaced with simple profit maximization. The shareholders of a firm which single-mindedly pursues profit would have the greatest return from their investments, and therefore the greatest available resources for charitable donations which align perfectly with their own tastes.

[2] Examples of empirical research in this style include Michal Strahilevitz and John G. Myers (1998), Sankar Sen and C. B. Bhattacharya (2001); Donald R. Lichtenstein, Minette M. Drumwright, and Bridgette M. Braig (2005); and Lois A. Mohr and Deborah J. Webb (2005). Similarly, Neeraj Arora and Ty Henderson (2007) use a survey-based methodology to uncover preferences for products with which small donations were associated.

[3] This figure is based on the total amount paid by consumers, including shipping charges. Unless noted, we take this interpretation of prices and premiums when we describe our results. We also report charity premiums for final prices alone, with shipping fees included as a control variable. Premium estimates based on prices inclusive of shipping are typically smaller than those based on final auction prices alone.

a private one), Morgan and Martin Sefton (2000) and Craig E. Landry et al. (2006) provide experimental evidence that lotteries can generate more charity revenue than solicited direct donations. In empirical studies of charity auctions, Jeffrey Carpenter, Jessica Holmes, and Peter H. Matthews (2008), Arthur J. H. C. Schram and Sander Onderstal (2009), and Douglas D. Davis et al. (2006) evaluate the charity auction format that is most lucrative, while in this paper we consider the more basic issue of whether charity auctions generate greater revenue than noncharity auctions.[4] Other related empirical work on charity auctions includes Peter T. L. Popkowski Leszczyc and Michael H. Rothkopf (2010), who study revenue differences among auctions with 0 percent, 25 percent, or 100 percent of revenue donated to charity, and Jose J. Canals-Cerda (2008), who finds a large charity premium on eBay items sold in late 2001 to benefit the victims of the 9/11 terrorist attacks.

We assemble data from eBay's Giving Works charity auction program. Many items sold on Giving Works are offered contemporaneously to similar objects in noncharity eBay auctions. eBay sellers who use Giving Works choose the share of revenue donated and the charity that will receive the donation. Nearly all Giving Works auctions have donation shares of 10 percent or 100 percent. The thickness of the main eBay market allows us to create a novel dataset in which charity auctions are matched with nearly identical items in noncharity auctions.[5] We identify matched items in a wide range of product categories and prices. With a median closing price of $41 and a mean of $88, the 2,433 auctions that comprise our data would be expensive to generate in a laboratory or field experiment. In addition to observing the closing prices of the auction items, we observe the levels and timing of all bids for the items under study. By comparing the bid timing in charity auctions to that in noncharity auctions, we are able to investigate whether charity bidding is driven purely by consumers' "warm-glow" utility from their own donations (James Andreoni 1990) or, at least in part, by consumers viewing charity revenue as a public good and therefore beneficial regardless of which bidder contributes to it.

We have four main findings. First, controlling for auction and seller characteristics, charity-linked products close at significantly higher prices, on average, than the prices of identical noncharity products. In 10-percent-share auctions, this premium is 5 percent, while in 100-percent-share auctions, the premium is 7 percent. Throughout the analysis, we establish that the results are robust to alternative empirical specifications. Second, the premium for 100-percent-share auctions declines monotonically with the value of the noncharity matched products, consistent with bidders deriving diminishing marginal utility from their donations. Third, bidders in 100-percent-share charity auctions submit their bids half a day earlier than bidders in noncharity auctions, and this appears to stimulate bidding wars that can generate utility for consumers who regard auction revenue as a public good. Fourth, we observe that the second-, third-, and fourth-highest bids in

[4] The cited papers vary in their findings on auction formats, and they provide limited or inconclusive results on whether charity auctions have greater average revenue than noncharity auctions.

[5] We use the term "nearly identical" to indicate that the items may be sold by different sellers, with different shipping terms, at different times. We control for these differences in the analysis. While some minor differences in product characteristics remain, the data were constructed to minimize these differences.

charity auctions are all significantly larger than the corresponding bids in noncharity auctions, and those who bid in both a charity and a noncharity auction for identical items bid higher in charity auctions, regardless of whether they win.

The paper proceeds as follows. We provide a brief overview of eBay and its Giving Works auctions in the next section. In Section II we review the relevant theory. In Section III, we describe the data. Section IV reports our empirical results, and Section V concludes.

I. Background on eBay and Giving Works

A. *Product Sales on eBay*

Founded in 1995, eBay has emerged as the world's largest auctioneer. At very low cost, sellers can offer an item for sale by describing the item, disclosing a small amount of personal information, and specifying an ending time and method for the sale. While many sales are indeed auctions, there is also a popular "Buy It Now" sales option wherein a consumer can secure an item immediately by indicating that he will pay a seller-specified fixed price. Sellers who allow a buy-it-now option can require either that payment of the fixed price is the only way to win the item, or that a true auction may be ended early by a consumer willing to pay a buy-it-now price. In the discussion below, we often use the term "auctions" to include both true auctions and buy-it-now sales. Deviations from this convention should be clear from context. Patrick Bajari and Ali Hortaçsu (2004) review the institutional details of eBay and internet auctions, and they summarize a broad body of literature that has emerged to examine trade in these markets.

To fix ideas for the discussion below on bid timing, we describe how bidding occurs in true auctions and what information is shared with other eBay bidders. Suppose an auction has an opening price of \$10 and has a \$1 minimum bid increment. If Bidder A submits the first bid of the auction at \$20, he becomes the current leader, yet his full bid is not displayed to other potential bidders. Instead, the current price of the object is displayed as \$10 (the opening price). If Bidder B submits the next bid at \$15, B's bid is reported in the auction's bidding history, and the current price is listed as \$16 with A identified as the current leader. If Bidder C submits a bid of \$30 and then the auction ends, C wins the auction at a price of \$21, and the final bidding history displays bids of \$20, \$15, and \$21 for A, B, and C. While eBay's bidding system is designed to encourage bidders to submit bids once during an auction, some bidders bid multiple times within a single sale. These bidders are described as naïve or incremental bidders in the economics literature on eBay, and they play an important role in the discussion on bid timing.

B. *Giving Works*

Giving Works was launched in November 2003 by eBay and MissionFish, a subsidiary of the not-for-profit Points of Light Foundation, to enable eBay sellers to donate some or all of their auctions' proceeds to charities.[6] From its launch through October 2007, eBay reported that its Giving Works program raised over $84 million through more than 1.3 million auctions. Although the median sale price of a Giving Works item in 2006 was about $10, the program has included several high-profile, high-value items. A lunch for 8 with Warren Buffet raised $620,000 for Glide, an anti-poverty organization based in San Francisco. Giving Works also hosted an auction for the 715th home run baseball hit by Barry Bonds, which sold for $220,100 and contributed 10 percent of revenue to Big Brothers Big Sisters of America.

Giving Works permits sellers to donate between 10 percent and 100 percent of auction revenue (in 5 percent increments) to over 10,000 different charities that are registered with MissionFish. The seller receives the full tax benefit of the donated charity auction revenue. Successful bidders are not able to claim any portion of their payments as tax deductible. An additional benefit for sellers is that eBay will credit back to the seller the same percentage of eBay listing fees that the seller chooses to donate in an auction.

Fee credits, combined with potential price premiums in Giving Works auctions, may reduce a seller's cost of charitable giving, net of taxes. Suppose a seller wishes to make a $10 charitable contribution and also sell an item with a market value of $100. If the seller lists the item with a $40 starting price[7] and the item sells for $100, he pays an eBay fee of $5.82, leaving him with net revenue of $94.18 from which to make his $10 tax-deductible donation. If the seller is subject to a 28 percent marginal tax rate, he will have $86.98 following the donation. By specifying that the auction donates 10 percent to charity, the seller receives a modest reduction in eBay fees, but more importantly has the opportunity to sell his product at a premium through Giving Works. If the seller receives $105 for his item after pledging a 10 percent donation, he will pay $5.39 in listing fees while making a tax-deductible $10.50 contribution. This leaves the seller with $92.05 after combining the sale with the (slightly larger) donation.

During the sample period MissionFish employed two different fee structures for charity auctions. Until September 13, 2006, MissionFish deducted $3 plus 2.9 percent of the donation amount as a fee. Additionally, Giving Works placed a floor of $10 on the donation amount, regardless of the donation share selected by the seller.[8] After September 13, 2006, the minimum donation was reduced to $5, and MissionFish adjusted its fees so that it receives between 3 percent and 20 percent of the donation, with the fee percentage declining with the donation size. We do not directly study the impact of this price change on bidders' and sellers' incentives in the present paper. In supplementary analysis not presented here, we find that the MissionFish fee structure and floor, which is not readily apparent to bidders, has no significant effect on bidder behavior.

In the last six months of 2006, roughly 36,000 items were listed for sale on Giving Works at any moment.[9] Bidders encountered these items in three main ways. First,

[6] eBay has hosted charity auctions since 2000. Giving Works is a more recent creation.
[7] During the period we studied, eBay's insertion fees increased in the starting price for the item to be sold.
[8] When a final sale price is less than the floor, all revenue is donated to the charity, minus MissionFish fees.
[9] Approximately 60 million listings were active on eBay during our period of study.

charity items were listed along with noncharity items when eBay shoppers use the web site's standard product search utilities.[10] When the results of a product search include charity auction items, these were distinguished from the noncharity items with a small blue and yellow ribbon which appears next to the auction title. When a user clicked on an auction title to view a detailed product description, he also learned the identity of the charity and the size of the donation. Second, the MissionFish Web site (www.missionfish.com) allowed users to search for charities by name and charity type and provided links to all products benefitting these charities. Third, eBay's main "front page" listed special promotions including charity auctions.

During our period of study, a substantial fraction of Giving Works items were listed as fixed-price items, which remain available until a buyer agrees to the seller's stated price. We do not analyze these sales in this paper. Instead, we focus on true auctions and buy-it-now sales, which each have defined opening and closing dates and a maximum duration of ten days. Given these characteristics, auctions and buy-it-now sales more closely meet our data objective to identify identical products that are available contemporaneously.

II. Related Theory

In this section we discuss the relationship between our empirical objectives and theory. We first focus on why prices in charity auctions may be higher than those in standard auctions for identical items. This discussion includes implications of consumers' opportunities to support charities through direct donations and explores analogies in retail markets. Second, we review the literature on bid timing and argue that bid timing in true eBay auctions allows us to test whether the public goods value of others' payments affects bidder behavior.

A. *Prices for Charity-Linked Products*

The main feature of a charity auction is that a bidder may receive utility from auction revenue, even when the bidder makes no payment of his own to the auctioneer. When this is the case, auction revenue may resemble a public good. Previous models of equilibrium charity auction bidding and revenue have primarily considered activity in sealed-bid auctions with independent private values (IPV) for the auctioned object (Goeree et al. 2005; Engers and McManus 2007). In Engers and McManus (2007), bidders receive utility of λ for each dollar paid to the auctioneer, regardless of its source. This represents the pure public goods benefit from charity auction revenue. In addition, bidders may receive a "warm glow" of Δ from their own payments to charity.[11] Bidders vary in their valuations for the auctioned object, but all have the same Δ and λ.

[10] In supplementary unreported analysis, we find that the Web pages of eBay charity auctions are visited no more or less frequently than the Web pages of noncharity auctions. This suggests that the positive charity premiums reported here are not driven by these auctions attracting greater attention from potential bidders.

[11] This warm glow is commonly included in models of voluntary contributions to public goods to allow for a personal benefit from donation. It is frequently noted that one person's contribution to a large public good

Equilibrium bids are above their IPV levels in a variety of auction formats. Here, we consider the results on second-price sealed-bid auctions, which are most similar to the ascending auction format used by eBay. With a positive benefit from other bidders' payments ($\lambda > 0$), bidders depart from the standard second-price auction strategy of bidding one's true valuation. This occurs because the bidder who places second will determine the winner's payment, and this bidder receives additional surplus from increasing his bid conditional on his position in the order of bids. A positive warm glow from one's own payment further increases bids above valuations. If the auctioneer donates only a share of revenue, $\sigma \in (0, 1]$, to charity, the analysis in Engers and McManus (2007) holds with $\sigma\Delta$ and $\sigma\lambda$ replacing Δ and λ. Bids are increasing in σ at all valuations, therefore auction revenue increases in σ as well.

Equilibrium charity auction models typically employ restrictions on utility and actions that are useful to relax when considering the eBay charity auction market. First, eBay shoppers may have the opportunity to choose among charity and non-charity listings of the same object, similar to conventional retail consumers who choose from among a variety of firms when purchasing a particular item. Second, bidders may consider donating directly to a charity rather than using the auction as their only avenue to offer support. Third, bidders may have diminishing marginal utility from charity revenue, an assumption that is common in models of direct donations (e.g., Andreoni 1990), but is eschewed in charity auction models to maintain tractability. While we know of no single theoretical treatment that incorporates both strategic bidding and these additional concerns, we can draw intuition from related research.

Previous research on markets with both charity and noncharity alternatives generally predicts that the former products will trade at a premium. Bagnoli and Watts (2003) study imperfect competition among differentiated firms that set prices and vary in whether they offer charity-linked products. Demand for charity-linked products is determined by consumers' personal tastes for the product, their additional benefit from any charity revenue generated by a product, and the aggregate expected charitable revenue from product sales. Prices of charity-linked products are above those of the noncharity firms, both because charity provides an additional valued product characteristic and because this characteristic introduces additional competition-softening differentiation. Leonid Polishchuk and Evgeny Firsov (2005) extend the analysis to competitive markets and show that profit-enhancing price premiums disappear when several firms link their products to the same charity, although prices remain above noncharity levels due to the firms' cost of making the pledged donation. David P. Baron (2007) offers a related model in which firms practicing corporate social responsibility (CSR) may attract both charity-oriented consumers and investors. Kotchen (2006) cautions that the introduction of charity-linked products, despite consumers' demand for them, does not always increase overall public good production relative to when consumers support charities through donations alone.

In the papers described above, consumers who purchase charity-linked products take this action to the exclusion of direct donations, either by assumption or as an

generally does not affect the size of the good significantly, so bidders must hold other motivations for giving. See Andreoni (2006) and the references within for additional discussion.

outcome of the choice setting.[12] To understand prices on eBay Giving Works, where consumers often have a role in determining prices while also retaining the option to donate directly, we introduce a simple model of willingness to pay for charity-linked products. While the work we cite above establishes that positive price premia can be expected, we are interested in understanding how the option to donate directly creates restrictions on the premia that should be observed. We present the details of this analysis in Appendix 1, but summarize its assumptions and results here.

Consumers compare two versions of an otherwise identical product. One version is associated with a charity, and a fraction (σ) of its price (p_c) is donated. The second version generates no charitable donation and has the price p_n, which is determined exogenously. Consumers vary in their preferences for charitable donations. While some consumers receive no benefit from donations, other consumers have a warm-glow utility, $w(d_i)$, and a public goods benefit, $a(D_{-i} + d_i)$, from their own donations (d_i) and the total donations of all other consumers (D_{-i}). We hold D_{-i} fixed in this analysis. The functions w and a are increasing and concave. A consumer donates a total amount, d_i, to charity by combining direct giving with any implicit donation through σp_c, if he purchases the charity item. Absent the opportunity to buy the charity product, the consumer selects an optimal donation level, d_i^*, by comparing the marginal benefit of a donation with its per-dollar price, which is less than \$1 when donations are tax deductible at the tax rate t. In our model, we assume that $d_i^* > 0$ for charity-minded consumers. A consumer with an altruistic benefit from total donations, $a(D_{-i} + d_i) > 0$, reduces his d_i^* as others' donations (D_{-i}) increase.

We use our model to describe relationships between p_c and p_n that allow consumers with positive d_i^* to purchase the charity version while consumers with no interest in the charity prefer to pay p_n for the noncharity version. The maximum charity premium a charitable consumer will pay depends on several factors. When $\sigma p_c < d_i^*$, the charity premium is limited by a "price constraint." In this case, the consumer uses direct contributions to top-off his indirect donation so that the total donation is d_i^*, and the charity premium is constrained by the price of making a direct contribution. In percentage terms, the charity premium must satisfy the condition $(p_c - p_n)/p_n \leq (1-t)\sigma/[1-(1-t)\sigma]$. When $t = 0$ and the charity version has $\sigma = 0.10$, the charitable consumer will pay a premium up to 11 percent, but when $t = 0.28$, the maximum premium on a product with $\sigma = 0.10$ falls to 7.8 percent. While the tax benefits of direct donations do not eliminate the charity premium, the consumer must be offered better terms on the fixed contribution σp_c to prefer the charity version. When $\sigma p_c > d_i^*$, on the other hand, the charity premium is limited by a "utility constraint." In this case, the consumer's maximum charity premium is limited by d_i^* and μ, which is the additional utility benefit a consumer receives from making an implicit donation greater than his ideal out-of-pocket donation. The charitable consumer will pay any $p_c \leq p_n + (1-t)d_i^* + \mu$. This yields a bound on the charity premium which, in percentage terms, falls as the product's value increases: $(p_c - p_n)/p_n \leq [(1-t)d_i^* + \mu]/p_n$. Despite the fact that μ increases as the excess donation

[12] In Bagnoli and Watts (2003), Polishchuk and Firsov (2005), and Baron (2007), consumers do not have the option to donate directly. In Kotchen (2006), consumers find that purchasing a charity-linked product dominates direct donations because of assumptions on the production technology and competitive pricing.

grows, we show in the Appendix that the charity premium declines in p_n. The bound may fall as the benefit of tax-deductible donations grows, depending on how quickly d_i^* increases with t.

The pattern of a diminishing charity premium in p_n is established at the individual consumer level, but it has the empirical implication that if consumers' tastes for charitable products are independent of their demand for products of varying value (represented by p_n), we expect to observe declining charity premiums in the Giving Works data. Alternatively, if consumers' values of d_i^* are positively correlated with their demand for luxury items, perhaps through income, then observed charity premiums may increase with noncharity prices for the same products.

B. *Bid Timing*

Late or last-minute bidding, also known as "sniping," is a common occurrence on eBay. This phenomenon has been documented by Alvin E. Roth and Axel Ockenfels (2002) and Patrick Bajari and Ali Hortaçsu (2003) with field data; by Dan Ariely, Ockenfels, and Roth (2005) in the laboratory; and by Jeffrey C. Ely and Tanjim Hossain (2009) in a field experiment. Several explanations have been offered for this practice, including: implicit collusion by bidders to avoid a price war, information withholding by an expert in a common-value auction, and optimal responses by strategic bidders when facing naïve bidders who submit their bids incrementally.[13] Incremental bidding occurs when a naïve bidder initially submits a low bid and then increases his bid in small increments until he is either the high bidder or cannot beat the current high bid at his maximum willingness to pay.[14] In each explanation of sniping, the strategic (one-time) bidder's main motivation is to reduce his own expected payment to the auctioneer. This ultimately leads to a reduction in expected revenue for the seller. For the purposes of this paper, a bidder's incentive to snipe is primarily useful to us because it reveals whether bidders value others' payments in a charity auction.

Ely and Hossain (2009) conduct an experiment in which they randomly choose to bid late or early ("squatting") within actual eBay auctions. They find that sniping generates a marginally higher net surplus relative to squatting, while auction revenue and opponents' maximum bids are reduced substantially in sniping treatments. This suggests that bidders who care about auction revenue will find less benefit in sniping than bidders who do not. Moreover, this incentive is salient when bidders have $\lambda > 0$ rather than $\Delta > 0$ while $\lambda = 0$. A positive value of Δ alone shifts the valuation distribution by $(1 - \Delta)^{-1}$, but changes nothing else about the auction. This results in all bidders increasing their maximum bids by $(1 - \Delta)^{-1}$, and the relative benefits of sniping and squatting are unchanged.

[13] The first explanation requires truly last-minute (or last-second) bidding with a positive probability of bids being lost in submission. In contrast, the third explaination does not require literal last-minute bidding, as incremental bidders may submit their bids well before the auction's closing time. Ariely, Ockenfels, and Roth (2005) demonstrate that strategic bidders will snipe even if there is no chance of bids being lost, and Ely and Hossain (2009) argue that sniping in private-value auctions is primarily useful as a strategy against naïve bidders rather than for collusion.

[14] We use the terms "naïve bidder" and "incremental bidder" interchangeably.

If strategic bidders in charity auctions are less likely to snipe because they care about other bidders' payments, this has implications for the number of bidders and bids observed in a charity auction. Ely and Hossain (2009) show that squatting reduces the number of active bidders and bids, as this strategy effectively deters bidders from entering the auction. Those who do bid, however, submit higher bids than in the sniping treatments, and naïve bidders require a greater number of bids to beat the squatting bidder's price. These results offer additional opportunities to verify that charity auction bid timing spurs more aggressive bidding by incremental bidders.

III. Data

We assembled a dataset of matched charity and noncharity eBay auctions that closed between March and December 2006. We began by searching eBay Giving Works for items that appeared possible to match to simultaneous noncharity auctions. In assembling potential matches, we were not able to sample randomly across products on Giving Works. Instead, because it is costly to identify charity auctions that can be matched, we focused our search in the product categories that were most likely to yield matches. These categories include consumer electronics, cameras and photography equipment, DVDs, computer equipment, and gift certificates. Conditional on searching a category or a product, we collected data on all Giving Works auctions that ended in a sale between March and December 2006.

Each search for a valid match began with a charity auction that concluded with a sale. Once we identified a charity auction, we searched for up to five noncharity auctions that ended in a sale within five days of the Giving Works item. Since most eBay auctions last for seven days, this process yielded matched collections of observations on auctions that were open simultaneously. When more than five matches were available, we selected the five successful auctions with ending times closest to the charity auction's end time.

We consider items in charity and noncharity auctions to be a match if the products are identical in physical characteristics. For example, all product characteristics observable to a bidder, such as model number, color, age, and apparent wear, are considered for the match. If the charity auction product is not new, it is matched to a noncharity product with a described condition that is indistinguishable from the charity item. For additional details on the search and matching process, please see Appendix 2.

Not all eBay auctions end in a sale, but our matching process and empirical strategy are designed to minimize the impact of unobserved auction characteristics that might differ systematically between charity and noncharity auctions and affect the sale probability. The product markets on which we focus are relatively thick compared to commonly listed items like jewelry, overstocked clothing items, and one-of-a-kind collectibles. The auctions in our data typically have several bidders per item, which means that final prices are likely to reflect the bidding preferences of consumers rather than the potentially idiosyncratic choices of sellers over the opening price or auction format. Moreover, because multiple auctions are required to form

Table 1—Summary Statistics for eBay Giving Works Auctions

	Obs.	Mean	Median	SD	Min.	Max.
Panel A. Charity auctions						
Sale price ($)	723	93.66	41.56	143.05	6.51	1,371.01
Sale price including shipping ($)	723	102.38	50.95	145.77	8.11	1,393.01
Shipping ($)	723	8.72	7.00	6.78	0	55.00
Length of auction (days)	723	6.51	7	1.74	1	10
Buy-it-now (dummy)	723	0.10	0	0.29	0	1
Power seller (dummy)	723	0.40	0	0.49	0	1
Seller rating	723	3,056	275	10,697	1	139,266
Seller positive ratings (percent)	723	99.4	99.8	1.4	83.3	100
Number of bids	654	9.99	9	7.44	1	57
Unique bidders	654	5.21	5	3.17	1	21
Donation percentage (percent)	723	66.2	100	42.0	10	100
Total donation, after fees ($)	723	43.43	16.80	93.12	3.32	1,025.12
Second highest bid	493	71.96	39.01	96.64	6.51	1,033.83
Third highest bid	432	65.12	35.00	90.99	1.04	976.02
Fourth highest bid	359	61.29	32.21	92.07	0.99	959.00
Fifth highest bid	276	61.36	34.01	92.51	0.16	888.88
Panel B. Noncharity auctions						
Sale price ($)	1,710	86.09	41.00	137.68	2	1,375.00
Sale price including shipping ($)	1,710	95.78	48.00	141.83	5.89	1,405.00
Shipping ($)	1,710	9.69	8.00	7.51	0	67.5
Length of auction (days)	1,710	5.29	7	2.31	1	10
Buy-it-now (dummy)	1,710	0.26	0	0.44	0	1
Power Seller (dummy)	1,710	0.33	0	0.47	0	1
Seller rating	1,710	6,677	401	23,531	1	309,979
Seller positive ratings (percent)	1,710	99.4	99.8	1.5	75	100
Number of bids	1,257	10.38	9	7.86	1	54
Unique bidders	1,257	5.58	5	3.51	1	20
Second highest bid	944	63.59	40.50	75.93	2.00	706.56
Third highest bid	826	59.30	36.87	70.96	1.00	701.37
Fourth highest bid	702	56.33	36.86	68.02	1.00	655.88
Fifth highest bid	584	53.90	37.00	66.24	0.01	651.90
Panel C. Charity premiums						
Premium over noncharity items	723	0.171	0.046	0.491	−0.583	6.750
Premium over noncharity items including shipping	723	0.088	0.033	0.275	−0.516	1.483

Notes: The sample includes only auctions that resulted in a sale and lasted ten days or fewer. Some eBay auctions do not result in sales because reserve prices are not met or the seller decides to remove or relist the item. The "Buy it now" dummy equals one if the auction ended at the seller's specified buy-it-now price. The "Power Seller" dummy equals one if eBay classified the seller as a Power Seller. The statistics for number of bids and unique bidders were calculated for true auctions only. Panel C provides the calculations of the ratio of charity auction prices to the average prices of the matched auctions (excluding the charity items).

a match, it is reasonable to assume that these frequently traded items allow bidders to form expectations about market-clearing prices, at least for noncharity items, and the very auctions that fail within these product categories are those that would be relatively uninformative about demand.

The matching process yielded a total of 2,433 auctions organized around 723 charity listings, for an average of 2.4 standard auctions per match. We provide summary statistics for charity and noncharity auctions in panels A and B, respectively, of Table 1. The mean prices for charity and noncharity auctions are $93.66 ($41.56 median) and $86.09 ($41.00 median), respectively, or $102.38 ($50.95 median) and

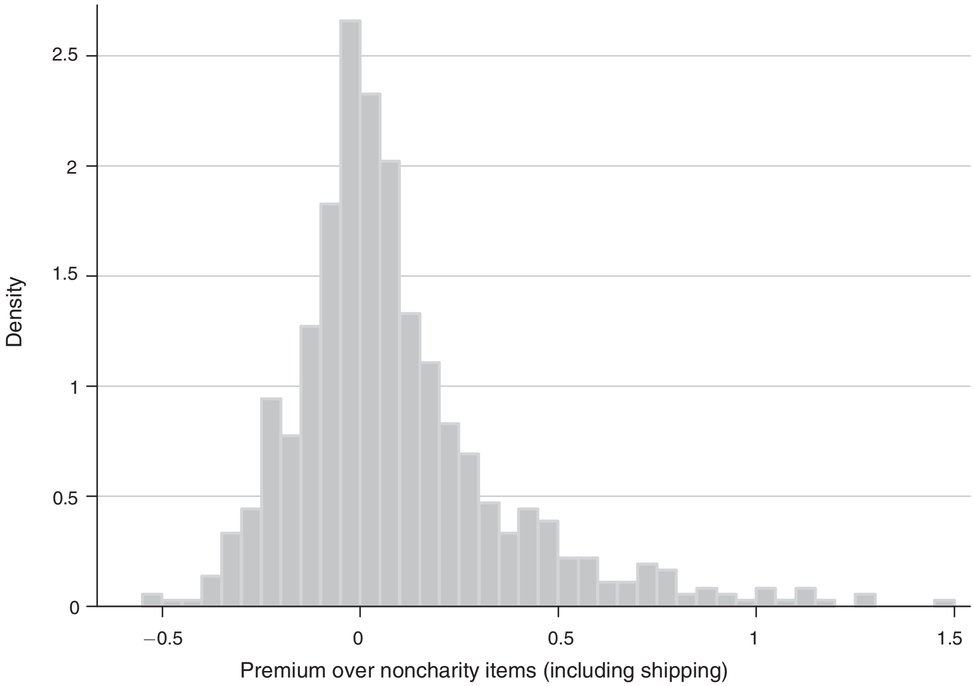

Figure 1. Distribution of Charity Premiums

Note: Charity premium is calculated as the fractional difference between the price of the charity item and the average price of all noncharity items in the matched set.

\$95.78 (\$48.00 median) if shipping charges are included in the total.[15] In panel C, we summarize the percentage difference between a match's charity price and the average noncharity price in the match, i.e., a preliminary measure of the charity premium. Figure 1 illustrates the dispersion of charity premiums in the data. Some variation in the premium is due to observable auction and seller characteristics that are captured with control variables in the empirical analysis.

In most cases the observed auction price is the second-highest bid plus a bidding increment. Exceptions are buy-it-now sales and when an auction has only one active bidder, in which case the price is the seller's opening price. In all auctions, we observe the date and time of every bid plus the associated bidder's eBay user name. Other than eBay user names, which are unique but often cryptic identifiers, and the bidder's feedback score (see below), we observe no additional information about bidders.[16] We observe all bid values for nonwinning bids, and for winning

[15] For 95 percent of observations, we record the seller's default shipping price and method. In instances when the seller permitted bidders to choose among shipping methods with no default, we record the price of US Priority Mail shipping. If Priority Mail was not offered as a shipping option, we select the delivery method most similar to the Priority Mail policy of delivery within two to three days.

[16] Others in the eBay community may use these identifiers to see what items the user has for sale or to see what the user has purchased in the last 30 days, as well as the prices for those purchases. During our period of study, eBay did not track or display the total charitable donations attributable to buyers or sellers.

bids eBay displays the second highest bid plus the bid increment (or, in the case that there is only one bidder, the seller's opening price). In Table 1, we summarize the second- through fifth-highest bids in auctions where these data are available. In each case, the average bid from the charity subsample exceeds its counterpart from the noncharity auctions.

Auctions in the charity sample are scheduled to run longer, on average, than the noncharity matched auctions (6.5 versus 5.3 days) and are significantly less likely to have been completed via the buy-it-now option (10 percent versus 26 percent). We do not differentiate between buy-it-now sales that did or did not begin with the option to run as true auctions. Comparing activity in true auctions, charity sales received slightly fewer bids (10.0 versus 10.4), on average, from slightly fewer unique bidders (5.2 versus 5.6).

Seller characteristics vary somewhat between the charity and noncharity samples. eBay calculates seller ratings by summing the winning bidder's feedback (–1, 0, +1) on each transaction. Because bidder feedback is almost always positive, we interpret this rating as a measure of seller experience. Seller ratings in noncharity auctions tend to be greater than ratings in charity auctions, but the average fraction of positive feedback is the same for both types of auction. Charity sellers are more often designated by eBay as "Power Sellers," indicating that the seller completes more than $1,000 per month in eBay transactions, maintains 98 percent positive feedback, and has an overall rating that exceeds 100.

Almost 60 percent of the observed charity auctions donate 100 percent of revenue to charity, and 29 percent of charity auctions donate 10 percent. Of the remaining charity auctions, most donation shares fall between 15 percent and 50 percent. Closing prices are typically greater when a smaller revenue share is donated. The median closing price is $30 in 100-percent-share auctions and $92 for 10-percent-share sales. The charity revenue of the observed auctions, which totaled more than $31,000 in net donations, was distributed to a broad set of organizations. In our sample, 330 unique charities appear, with each charity appearing an average of 2.2 times. These charities vary widely in their objectives and scale, ranging from UNICEF to local churches and animal shelters. To illustrate the breadth of charities represented, in Table 2 we list alphabetically the first 40 charities that appear in our sample. In additional unreported analysis, we have investigated whether charity premiums vary with charity characteristics such as religious affiliation, regional focus, and size.[17] The premiums appear unaffected by these characteristics.

IV. Empirical Analysis

Our objective is to investigate whether (and why) consumers will pay more for a charity-linked product. The closing price of an auction is our main outcome of interest, but other events such as the timing and frequency of bidding also allow us to

[17] For each charity in the data, we have identified that: 12.5 percent have a religious affiliation or mission, 40.3 percent appear on the 2006 *Forbes Magazine* list of 200 largest US nonprofits or have a parent organization on the list, and 35.3 percent have a regional focus within the United States or in a particular part of the world outside of the United States.

Table 2—A Sampling of Charities in the Data

Charity name	Auctions in sample
21st Century CARES	1
3d&i	8
9/11 Families Give Back Fund	1
A Gift for the Future Children's Fund	3
A Glimmer of Hope	2
A Home Within	1
AIDS Research Consortium of Atlanta	1
All Children's Assistance Fund	2
ASPCA: American Society for the Prevention of Cruelty to Animals	5
Ability First	1
Abused and Homeless Children's Refuge/Alternative House	1
Adams Elementary School PTA	2
Adirondack Scholarship Foundation, Inc.	1
Admiral Jeremiah Denton Foundation	1
Adopted By Christ Ministries	2
Advocates for Children	1
African Well Fund	1
After-School All-Stars	1
Alex's Lemonade Stand Foundation	1
All Faiths Pantry	2
Alley Cat Allies	1
Alley Cat Rescue	1
Alzheimer's Assn, Central New York Chapter	9
Alzheimer's Assn, Hudson Valley/Rockland/Westchester NY Chapter	1
AmeriCares Foundation Inc.	3
American Breast Cancer Foundation	5
American Cancer Society	2
American Cancer Society–California Division	2
American Cancer Society, Eastern Division, Inc.	2
American Diabetes Association	2
American Heart Association National Center	1
American India Foundation	1
American Numismatic Association	3
American Red Cross	3
American Red Cross–Fresno Madera Chapter–Fresno, CA	1
American Red Cross–Northeast Georgia Chapter	2
American Red Cross–San Francisco Bay Area Chapter	2
American Red Cross–Oregon Pacific Chapter–Eugene, OR	1
American Tortoise Rescue	2
Amnesty International	1

Notes: There are 330 charities in our data. This table lists the first 40 organized alphabetically by charity name.

describe bidders' motivations. These endogenous measures of auction performance are influenced by many factors. To introduce notation, we begin by describing the determinants of the winning bidder's payment.

The winner's payment is affected by many factors, including product attributes observed by all market participants and the econometrician; product attributes known to the seller and perhaps the bidders, but unobserved by the econometrician; seller characteristics that are fixed before the auction starts; auction characteristics selected by the seller; and the actions of other bidders who participate in the auction. We index auctions by i and let $PRICE_i$ denote the closing price of the auction. The winner pays $PRICE_i$ plus any shipping charges, $SHIPPING_i$. We use the term "full price" to refer to the total payment of $(PRICE_i + SHIPPING_i)$. The common product attributes within a matched set of auctions, m, are captured by the match-specific dummy variable, α_m. Any product and auction characteristics unobserved by the econometrician and varying within m are in the error term ε_{im}. Seller characteristics, such as experience and power seller status, are taken as exogenous by all agents as auction i begins, and these are collected in the vector $SELLER_i$. We create individual dummy variables for five high-volume sellers whose items each appear in more than 2 percent of our charity auction sample. We include these dummy variables in $SELLER_i$ in some specifications to evaluate the impact of the high-volume sellers on our results.

Each seller chooses whether to donate a portion of the auction revenue to a charity. Information on charity status is contained in the vector $DONATION_i$, which includes dummy variables for a variety of donation levels. Additionally, sellers choose a vector of auction characteristics such as buy-it-now status, the length of the auction, and shipping fees. These are included in the vector $AUCTION_i$. We code auction length with a set of dummy variables that indicate whether an auction's scheduled duration was three, five, seven, or ten days, and we designate auctions of one day as the omitted category. While we are concerned that the entries in $AUCTION_i$ may be correlated with the information in ε_{im}, we retain these variables in most of our analysis as additional control variables. Finally, the number of bidders and the timing of their bids are endogenous variables which may be shifted by the values in $DONATION_i$ and the other attributes of an auction. These endogenous variables may affect price as well, but they are excluded from our main empirical model of auction prices.

In our empirical analysis, we estimate the effects of α, *DONATION*, *AUCTION*, and *SELLER* on prices and (separately) other endogenous variables discussed above. For example, we model the relationship between the closing price and auction characteristics as:

$$\log(PRICE_{im}) = \alpha_m + DONATION_i\beta + AUCTION_i\gamma + SELLER_i\delta + \varepsilon_{im}. \tag{1}$$

The included variables within *DONATION*, *AUCTION*, and *SELLER* vary across specifications. We refer readers to the Tables for precise specifications. In equation (1), the parameter vector β represents the full effect of a charity auction on price, which may occur through multiple mechanisms, such as shifts in bidder willingness to pay and changes to the number of bidders. The separate effects of charity donations on bid timing and bids per bidder are estimated as variants of equation (1) with $\log(PRICE)$ replaced with the appropriate dependent variable. We adjust the model specification as necessary when the dependent variable takes discrete values. In the analysis below, we exploit the matched structure of the data. Model parameters are identified through the differences within a match. In computing standard errors, we cluster by match to account for potentially heterogeneous charity premiums across matches.

The analysis proceeds in four parts. We first examine how final prices are affected by a seller's decision to donate a share of the auction's proceeds. Second, we describe how the charity premium varies with the average price of products within a match. Third, we examine differences in the bid timing and frequency across charity and noncharity auctions. Fourth, we explore whether bidders broadly share an increased willingness to pay for charity-linked products, or if taste differences are concentrated among the bidders who win charity auctions.

A. *Is There a Charity Premium?*

To test whether eBay buyers pay more for items in charity auctions than in standard auctions, we estimate equation (1) and report the results in Table 3. In column 1 of Table 3, we report the estimated price premium as the coefficient on *CHARITY*, a dummy variable entry of *DONATION* that equals one if any donation is made and zero otherwise. In addition to the *CHARITY* dummy, we include controls for auction and seller characteristics which apply to both charity and standard auctions. We find that the closing prices in charity auctions are 9.7 percent greater than in standard auctions ($p < 0.001$). The specification in column 1 explains a very high proportion of the variation in the data (over 97 percent), which we interpret as evidence that the match criteria worked well as the data were collected. In column 2, we construct the dependent variable as log(*PRICE* + *SHIPPING*), which accounts for any differences in shipping charges between charity and noncharity sales. The estimated charity premium falls to 6.0 percent, but this coefficient remains significant at $p < 0.001$. The difference in charity premiums in columns 1 and 2 can be attributed to the general tendency of noncharity sellers to set larger shipping fees than charity sellers.[18] If bidders (rationally) account for inflated shipping charges, they depress their noncharity bids relative to charity bids, which inflates the estimated charity premium in column 1.[19] The analysis in column 3 adds additional control variables for high-volume sellers, and there is virtually no change in the estimated charity premium.

In columns 4, 5, and 6 of Table 3, we investigate whether charity premiums are different in 10-percent-share, 100-percent-share, and other charity auctions. We specify three dummy variables in *DONATION* to indicate these cases, respectively: *10%-SHARE*, *100%-SHARE*, and *MID-SHARE*. When shipping charges are included as a control (column 4), the estimated coefficients on *10%-SHARE*, *100%-SHARE*, and *MID-SHARE* indicate premiums of 6.6 percent, 12.1 percent, and 6.4 percent, respectively.[20] When we specify the full price as the dependent variable (column 5), the estimated premiums are 5.1 percent, 7.2 percent, and 2.8 percent, respectively, and adding controls for high-volume sellers (column 6) yields estimates of 3.9 percent, 8.2 percent, and 2.7 percent, respectively. In each regression, the coefficients on *10%-SHARE* and *100%-SHARE* are statistically different from zero at the $p < 0.05$ level, and in all but one case these coefficients are significant at the $p < 0.001$ level. Coefficients on *MID-SHARE* are significantly different from zero in column 4 only.

[18] This observation follows from unreported fixed-effect regressions of shipping charges on auction characteristics and *CHARITY*.

[19] For further discussion of how sellers' shipping charges affect bidders' actions, see Hossain and John Morgan (2006).

[20] We have repeated the analysis in Table 3 using true marginal donation rates instead of the sellers' donation rate choices. The donation rates differ when a charity product's sale price does not generate the MissionFish minimum donation. The coefficient estimates for marginal donation rates are nearly identical to those which use sellers' donation rate choices.

Table 3—Charity Premium Estimates

Dependent variable	log price (1)	log (price + shipping) (2)	log (price + shipping) (3)	log price (4)	log (price + shipping) (5)	log (price + shipping) (6)
Charity variables						
CHARITY	0.097***	0.060***	0.059***			
	[0.012]	[0.009]	[0.010]			
10%-SHARE				0.066***	0.051***	0.039*
				[0.017]	[0.014]	[0.015]
100%-SHARE				0.121***	0.072***	0.082***
				[0.016]	[0.012]	[0.014]
MID-SHARE				0.064*	0.028	0.027
				[0.029]	[0.024]	[0.024]
Auction and seller characteristics						
log (seller rating)	0.004	0.006†	0.005	0.004	0.006†	0.005†
	[0.004]	[0.003]	[0.003]	[0.004]	[0.003]	[0.003]
Seller positive ratings (percent) = 100	0.035	0.016	0.013	0.033	0.016	0.010
	[0.024]	[0.018]	[0.019]	[0.024]	[0.018]	[0.019]
Seller positive ratings (percent) $\in$ [99.5, 100)	0.042	0.012	0.008	0.039	0.012	0.004
	[0.026]	[0.020]	[0.020]	[0.026]	[0.020]	[0.020]
Seller positive ratings (percent) $\in$ [99.0, 99.5)	0.048†	0.006	0.001	0.039	0.002	–0.002
	[0.027]	[0.021]	[0.022]	[0.028]	[0.021]	[0.022]
Seller positive ratings (percent) $\in$ [98.0, 99.0)	0.014	0.002	–0.004	0.014	0.002	–0.004
	[0.032]	[0.023]	[0.023]	[0.031]	[0.023]	[0.023]
Power Seller dummy	0.021	0.018†	0.020†	0.017	0.016	0.016
	[0.015]	[0.011]	[0.011]	[0.015]	[0.011]	[0.011]
Length = 3 days	0.007	–0.001	0.001	0.007	–0.001	0.001
	[0.020]	[0.015]	[0.015]	[0.020]	[0.015]	[0.015]
Length = 5 days	0.012	0.010	0.009	0.014	0.010	0.009
	[0.023]	[0.017]	[0.017]	[0.023]	[0.017]	[0.017]
Length = 7 days	0.029	0.008	0.010	0.028	0.008	0.009
	[0.019]	[0.014]	[0.015]	[0.019]	[0.014]	[0.015]
Length = 10 days	0.115**	0.077**	0.065*	0.112**	0.075**	0.059*
	[0.037]	[0.027]	[0.027]	[0.037]	[0.027]	[0.027]
Buy-it-now dummy	0.069***	0.045***	0.042***	0.071***	0.046***	0.043***
	[0.015]	[0.011]	[0.011]	[0.015]	[0.011]	[0.011]
Shipping ($)	–0.007***			–0.007***		
	[0.001]			[0.001]		
Large seller dummies	N	N	Y	N	N	Y

Notes: For each model there are 2,433 observations and 723 groups. The *CHARITY* variable is coded as 1 if the seller allocated a positive portion of the final sale price to a charity and 0 otherwise. The *10%-SHARE* variable is coded as 1 if the seller allocated 10 percent of the final price to charity and 0 otherwise; the *100%-SHARE* variable was coded as 1 if the seller allocated 100 percent of the final price to a charity and 0 otherwise; and *MID-SHARE* was coded as 1 if the seller allocated between 15 and 95 percent (inclusive) to a charity and 0 otherwise. The models contain a fixed effect for each product. Robust standard errors, clustered on product match, are in brackets.

***Significant at the 0.1 percent level.
**Significant at the 1 percent level.
*Significant at the 5 percent level.
†Significant at the 10 percent level.

Table 4—Robustness Analysis of the Charity Premium
(*Dependent variable:* log (*Price* + *Shipping*)

Specification	Baseline (1)	No buy-it-now (2)	7 day duration (3)	Day and time dummies (4)	Control for opening price (5)	Control for unique bidders (6)	2+ unique bidders (7)
10%-SHARE	0.051***	0.049**	0.050†	0.050***	0.046**	0.051***	0.043**
	[0.014]	[0.016]	[0.026]	[0.014]	[0.016]	[0.016]	[0.016]
100%-SHARE	0.072***	0.076***	0.082***	0.072***	0.084***	0.077***	0.078***
	[0.012]	[0.014]	[0.021]	[0.012]	[0.014]	[0.014]	[0.015]
MID-SHARE	0.028	0.025	0.014	0.025	0.024	0.026	−0.006
	[0.024]	[0.027]	[0.053]	[0.024]	[0.028]	[0.027]	[0.027]
Buy-it-now included?	Y	N	N	Y	N	N	N
N groups	723	571	295	723	534	568	488
N observations	2,433	1,746	753	2,433	1,661	1,732	1,461

Notes: The *10%-SHARE* variable is coded as 1 if the seller allocated 10 percent of the final sale price to charity and 0 otherwise; the *100%-SHARE* variable was coded as 1 if the seller allocated 100 percent of the final price to a charity and 0 otherwise; and *MID-SHARE* was coded as 1 if the seller allocated between 15 and 95 percent (inclusive) to a charity and 0 otherwise. The models contain a fixed effect for each product. In addition to the charity variables plus any controls described in the column heading, we include the same set of control variables as in Table 3. The number of groups and observations varies across columns because we include only observations for which there is both a charity auction and at least one noncharity auction that meet the data restrictions of each column. Robust standard errors, clustered on product match, are in brackets.

***Significant at the 0.1 percent level.
**Significant at the 1 percent level.
*Significant at the 5 percent level.
†Significant at the 10 percent level.

Apparent differences in estimated charity premiums across auctions may be due to differences in the products for sale within each donation category. As noted in Section III, the products in 10-percent-share auctions have a substantially greater average value than those sold in 100-percent-share auctions. Furthermore, as described in Section IIA, bidders' benefits from auction revenue may have different impacts on prices in 10-percent-share and 100-percent-share auctions. These differences are investigated in the next subsection.

To assess the robustness of our results, we repeat the analysis from Table 3's, column 5 on a variety of subsamples of our data. We present these additional results in Table 4, with the estimates from column 5 in Table 3 reproduced in the first column of Table 4 to facilitate comparison. In columns 2 and 3 of Table 4, we drop all buy-it-now sales, with column 3 limited to true auctions that lasted exactly seven days. The coefficient estimates on the *10%-SHARE* and *100%-SHARE* dummy variables are largely unchanged, with some loss of significance due to the reduced number of observations. For column 4, we add dummy variables for the day of the week on which the auction closed, plus dummy variables to indicate the closing time of a sale in one of six four-hour periods. The magnitude and significance of our charity coefficient estimates are virtually unchanged.

The remaining models on Table 4 allow us to evaluate whether the error term in equation (1) is likely to contain information correlated with *DONATION*, perhaps due to our sample selection rule, which conditions on successfully sold items. We first consider the possibility that sellers who know that they possess items with favorable characteristics (unobservable to the econometrician) will set greater opening prices. In column 5, we show that including an auction's opening price as an additional control variable does not affect our charity coefficient estimates, and, in fact, the coefficient on the opening price is estimated precisely at nearly zero.[21] We obtain similar results in models which include interactions between the opening price and dummy variables in *DONATION*. Next, we re-estimate the model with an auction's number of bidders included as a control, again to pick up unobserved auction attributes that attracted additional bidders and to provide preliminary evidence on whether our estimates in Table 3 are driven by differences in the numbers of bidders. In column 6 of Table 4 we show that the number of bidders has almost no effect on the estimated charity premiums.[22] Finally, we restrict the sample to true auctions in which multiple bidders placed bids. This reduces the role of potentially idiosyncratic opening prices, which can affect items' final prices and whether they sell at all. Our results, which are reported in column 7, show that the coefficient estimates on *10%-SHARE* and *100%-SHARE* are again nearly unchanged relative to column 2.

B. *Does the Charity Premium Fall with Product Value?*

In Section IIA, we argue that diminishing marginal utility from charity revenue can lead to falling charity premiums as price increases. We investigate this issue in the data by separating the 10-percent-share and 100-percent-share charity auctions into four quartiles (each) based on the average price of the auctions within a match.[23] For 10-percent-share auctions, the prices at the twenty-fifth, fiftieth, and seventy-fifth percentiles are \$44, \$93, and \$145, respectively. The twenty-fifth, fiftieth, and seventy-fifth percentile values of 100-percent-share auctions are \$18, \$28, and \$60, respectively. Because the number of observations is more limited for auctions with $\textit{MID-SHARE} = 1$, the data on these auctions are split at the median, \$38. The premium in each quartile (or half) is then estimated by creating separate dummy variables for each donation level and price quantile.

We present the results of this analysis in Table 5. Columns 1 and 2 use $\log(\textit{PRICE})$ and $\log(\textit{PRICE} + \textit{SHIPPING})$ as the dependent variable, respectively, and columns 3 and 4 repeat the analysis with high-volume seller dummies. Each specification shows similar results. For 100-percent-share auctions, the premium is highest for the lowest value items and falls steadily from the first to fourth (highest) quartile.[24] For auctions with $\textit{MID-SHARE} = 1$, the premium is large and statistically significant

[21] The coefficient estimate is 7.8×10^{-5} with a standard error of 5.9×10^{-5}. This result provides additional verification that our matching procedure worked well.

[22] The appropriate comparison here is to column 2, as both columns 2 and 6 are estimated without buy-it-now sales.

[23] We use the average price of all auctions within a match rather than the average price of all noncharity auctions. To see why this is desirable, consider a match in which there is one charity and one noncharity auction, and ε_{im} represents shocks to demand that are unobservable to the econometrician and differs across items in the match. Were only the prices of noncharity auctions used to rank auctions, matches in which the shock to the noncharity auction is negative (positive) are more likely to appear in the lower (higher) quantiles of the price distribution, resulting in an over- (under-)estimation of the charity premium within the quantile.

[24] The magnitude of the premium in dollar terms does not change much over the price distribution. Using the estimates from column 2 on 100-percent-share auctions, the corresponding auctions at the 12.5th, 37.5th, 62.5th, and 87.5th percentiles of noncharity prices would have premiums of \$2.40, \$2.04, \$2.81, and \$2.47, respectively.

Table 5—Charity Premium Estimates and Product Value

Dependent variable	log price (1)	log (price + shipping) (2)	log price (3)	log (price + shipping) (4)
Charity variables				
10%-SHARE				
× 0–25th percentile	0.093*	0.048	0.095*	0.049
	[0.041]	[0.033]	[0.041]	[0.034]
× 25th–50th percentile	0.039	0.032	0.032	0.023
	[0.031]	[0.026]	[0.033]	[0.027]
× 50th–75th percentile	0.089**	0.081**	0.055†	0.042
	[0.030]	[0.027]	[0.030]	[0.027]
× 75th–100th percentile	0.036	0.040*	0.036	0.038*
	[0.023]	[0.019]	[0.023]	[0.019]
100%-SHARE				
× 0–25th percentile	0.244***	0.133***	0.234***	0.149***
	[0.040]	[0.026]	[0.042]	[0.028]
× 25th–50th percentile	0.143***	0.073***	0.135***	0.090***
	[0.027]	[0.020]	[0.032]	[0.023]
× 50th–75th percentile	0.080*	0.061*	0.088**	0.081**
	[0.032]	[0.027]	[0.033]	[0.029]
× 75th–100th percentile	0.014	0.019	0.025	0.032*
	[0.019]	[0.016]	[0.019]	[0.015]
MID-SHARE				
× 0–50th percentile	0.121**	0.055	0.120**	0.055
	[0.046]	[0.035]	[0.046]	[0.036]
× 50th–100th percentile	0.002	–0.002	0.003	–0.003
	[0.033]	[0.030]	[0.036]	[0.030]
Auction and seller characteristics				
log (seller rating)	0.004	0.005†	0.002	0.005†
	[0.004]	[0.003]	[0.004]	[0.003]
Seller positive ratings (percent) = 100	0.034	0.016	0.031	0.010
	[0.024]	[0.018]	[0.024]	[0.018]
Seller positive ratings (percent) ∈ [99.5, 100)	0.037	0.010	0.036	0.001
	[0.026]	[0.020]	[0.026]	[0.020]
Seller positive ratings (percent) ∈ [99.0, 99.5)	0.035	0.002	0.025	0.000
	[0.027]	[0.021]	[0.028]	[0.022]
Seller positive ratings (percent) ∈ [98.0, 99.0)	0.013	0.002	0.006	–0.005
	[0.031]	[0.023]	[0.031]	[0.023]
Power Seller dummy	0.017	0.016	0.019	0.017
	[0.015]	[0.011]	[0.015]	[0.011]
Length = 3 days	0.012	0.001	0.013	0.003
	[0.019]	[0.015]	[0.019]	[0.015]
Length = 5 days	0.019	0.013	0.017	0.013
	[0.023]	[0.017]	[0.023]	[0.017]
Length = 7 days	0.033†	0.010	0.034†	0.012
	[0.019]	[0.014]	[0.019]	[0.014]
Length = 10 days	0.123***	0.081**	0.107**	0.064***
	[0.036]	[0.027]	[0.036]	[0.027]
Buy-it-now dummy	0.071***	0.046***	0.070***	0.043***
	[0.015]	[0.011]	[0.015]	[0.011]
Shipping ($)	–0.007***		–0.007***	
	[0.001]		[0.001]	
Large seller dummies	N	N	Y	Y

Notes: For each model there are 2,433 observations and 723 groups. Percentile cutoffs are based on the average price of all items in the matched set. The models contain a fixed effect for each product. Percentile cutoffs are $44, $93, and $145 for *10%-SHARE* auctions, $18, $28, and $60 for *100%-SHARE* auctions, and $38 for *MID-SHARE* auctions. Robust standard errors, clustered on product match, are in brackets.

***Significant at the 0.1 percent level. **Significant at the 1 percent level.
*Significant at the 5 percent level. †Significant at the 10 percent level.

for low-value items and is statistically indistinguishable from zero for high-value items when log (*PRICE*) is employed as the dependent variable. Both estimates are insignificant when log ($PRICE + SHIPPING$) is used, although the magnitude of the estimated premium for low-value items remains substantially greater. For 10-percent-share auctions, no consistent pattern of decline can be observed. In these auctions, the premiums tend to be larger in the first quartile than in the fourth, but the difference between the coefficients is not statistically significant.

The declining charity premiums support the notion of diminishing marginal values for charitable giving. As the value of auctioned items increase, the resulting donations in 10-percent-share and 100-percent-share charity auctions become substantial without any additional charity premium. This is especially salient for 100-percent-share auctions. At the twenty-fifth percentile, 100-percent-share auctions generate donations of approximately $20, which is more than the donations generated by 10-percent-share auctions at their seventy-fifth percentile. It is therefore reasonable that the decline in the estimated charity premium appears at lower percentiles in 100-percent-share auctions and the decline is more abrupt. Moreover, as prices and donation levels increase, we suspect that bidders become more concerned about the quality of the match between the seller's charitable interest and their own. Maintaining a substantial charity premium for high-value items may be impossible when the dollar value of the premium exceeds the bidder's utility gain from switching to an out-of-pocket donation to a personally favored charity.

C. *Bid Timing and Frequency*

In Section IIB, we argue that a bidder's incentive to delay bidding could be weakened in a charity auction if he receives positive utility from the donations of other bidders. In terms of the static bidding model reviewed in Section IIA, this is when $\lambda > 0$. We investigate this issue in two ways. First, we examine the lag between the time of a bidder's final bid and the auction ending time. Second, we test whether shifts in charity bid timing are associated with additional bidders bidding aggressively.

Our analysis of the duration (in days) between bids and an auction's end time involves an empirical model similar to equation (1), but with measures of bidder experience (functions of their eBay feedback scores) as additional control variables.[25] We exclude buy-it-now sales from the analysis. The differences on Table 1 in scheduled auction duration by charity status are greatly reduced if we also drop the auctions that ran for three days or fewer, and eliminating these observations has no effect on the results described below. We continue to employ match-specific fixed effects and report standard errors that are clustered by match. While match fixed effects previously captured the average value of the noncharity components of an auctioned object, in this analysis the match fixed effects control for the average bid timing choices for a product.

We begin by estimating the timing of final bids for all bidders observed in our matched sample. These results are reported in column 1 of Table 6. In this specification,

[25] Ariely, Ockenfels, and Roth (2005) and Ockenfels and Roth (2006) find that sniping is more common by more experienced bidders.

individuals' maximum bids in 100-percent-share auctions occur, on average, 0.42 days earlier than in the matched non-charity auctions. This result is significant at $p < 0.001$. Final bids arrive 0.32 days earlier in auctions with $MID\text{-}SHARE = 1$ relative to standard auctions. We find no significant change in bid timing for 10-percent-share auctions, which suggests that in these auctions the anticipated incremental donations of other bidders may be too small to warrant shifting bid times. When we repeat the analysis on a subsample of bidders who bid exactly once, the estimated time differences between charity and noncharity bids are slightly larger.

Next, we consider whether the shift in bid timing could be caused by bidder selection across charity and noncharity auctions. It is possible that λ has no role in influencing bid timing, and charity bidders possess a nonstrategic preference to bid earlier. We test this alternative explanation by constructing a subsample of bids placed by bidders who were active in both charity and noncharity auctions within a matched set of sales. For each bidder-product combination we create a new fixed effect and estimate whether the individual consumer's bidding occurs earlier in the charity auction. Results are reported in column 2 of Table 6. We find that final bids in 100-percent-share auctions again occur about half a day earlier than in the matched standard auctions ($p < 0.01$). Thus, an auction's charity status affects the bid timing choices of individual bidders, which is consistent with a shift in bidding incentives due to the public goods nature of auction revenue.

Most of the existing research on bid timing in online auctions has focused on literal last-minute (and last-second) bidding.[26] Our data are insufficient for this analysis, as there are too few matched auctions with variation in discrete measures of bid timing in the final moments of an auction. In a related paper (Daniel W. Elfenbein and Brian McManus 2010), we employ a different dataset and ask whether charity auctions differ significantly from noncharity auctions in the incidence of last-minute bidding or "sniping." That work corroborates the results in the present paper, finding that bidding immediately before the end of an auction is significantly less common in charity auctions and that the effects are particularly pronounced in 100-percent-share and mid-share auctions.

We now examine the effects of bid timing choices. In Ely and Hossain (2009), squatting results in greater revenue because naïve bidders who arrive late at the auction need to bid more aggressively to win. Therefore, if early bidding by strategic bidders did not inspire more aggressive bidding later in the charity auction, then our estimated shift in bid timing would fail to support the revenue-increasing process described by Ely and Hossain (2009). This would not reject Ely and Hossain's (2009) analysis in its own setting, but instead suggests that their model should not be applied to public goods motivations at eBay charity auctions.

We study this aspect of charity bid timing by creating a measure of incremental bidding. Within each auction, we count the number of bids each bidder submits and identify a bidder as incremental (i.e., naïve) if he places multiple bids.[27] This

[26] The recent research of Ely and Hossain (2009), however, suggests that late bidding does not need to occur in the last minutes of an auction to be worthwhile.

[27] More precisely, this is a measure of whether an incremental bidder reveals himself as such. "Unprovoked" naïve bidders will bid only once in an auction when all other bidders snipe.

Table 6—Bid Timing and Frequency

Dependent variable:	Days before auction close (1)	Days before auction close (2)	Multiple bids for a bidder? (Yes = 1) (3)	Incremental bidder wins? (Yes = 1) (4)
Charity variables				
10%-SHARE	0.093	0.039	0.014	−0.020
	[0.101]	[0.175]	[0.020]	[0.053]
100%-SHARE	0.417***	0.491**	0.031†	0.088*
	[0.096]	[0.186]	[0.018]	[0.040]
MID-SHARE	0.322†	0.177	0.002	−0.005
	[0.173]	[0.304]	[0.030]	[0.078]
Auction and seller characteristics				
log (seller rating)	0.048†	−0.023	0.002	−0.001
	[0.026]	[0.056]	[0.005]	[0.011]
Seller positive ratings (percent) = 100	0.102	0.123	0.004	0.024
	[0.124]	[0.291]	[0.025]	[0.059]
Seller positive ratings (percent) ∈ [99.5, 100)	−0.129	−0.212	0.009	0.094
	[0.154]	[0.380]	[0.033]	[0.069]
Seller positive ratings (percent) ∈ [99.0, 99.5)	0.022	−0.227	−0.001	0.029
	[0.158]	[0.321]	[0.034]	[0.080]
Seller positive ratings (percent) ∈ [98.0, 99.0)	−0.083	0.210	0.015	0.091
	[0.180]	[0.365]	[0.034]	[0.078]
Power Seller dummy	0.172†	0.262	−0.009	−0.017
	[0.095]	[0.236]	[0.020]	[0.045]
Length = 3 days	0.286*	−0.795**	0.030	0.051
	[0.117]	[0.251]	[0.027]	[0.057]
Length = 5 days	0.910***	0.210	0.061*	0.030
	[0.146]	[0.291]	[0.028]	[0.065]
Length = 7 days	1.608***	0.774**	0.049*	0.043
	[0.141]	[0.269]	[0.025]	[0.056]
Length = 10 days	2.946***	2.558***	0.088*	0.047
	[0.353]	[0.532]	[0.043]	[0.109]
Bidder characteristics				
(Feedback rating/1,000)	0.086		−0.112***	−0.185***
	[0.059]		[0.014]	[0.046]
$(\text{Feedback rating}/1{,}000)^2$	−0.006*		0.004***	0.019**
	[0.003]		[0.001]	[0.006]
Product match dummies	Y	N	Y	Y
Bidder-product dummies	N	Y	N	N
Observations	8,429	739	8,429	1,648
Groups	534	332	534	534

Notes: The *10%-SHARE* variable is coded as 1 if the seller allocated 10 percent of the final sale price to charity and 0 otherwise; the *100%-SHARE* variable was coded as 1 if the seller allocated 100 percent of the final price to a charity and 0 otherwise, and *MID-SHARE* was coded as 1 if the seller allocated between 15 and 95 percent (inclusive) to a charity and 0 otherwise. Robust standard errors, clustered on product match, are in brackets.

***Significant at the 0.1 percent level.
**Significant at the 1 percent level.
*Significant at the 5 percent level.
†Significant at the 10 percent level.

definition is necessarily ad hoc, since it is impossible for us to discern the difference between actual naïve bidders and strategic bidders who may revise their bids with the arrival of new information. Bidders, indexed by j, have their bidding status for auction i recorded in the indicator variable $INCR_{ij}$. We set $INCR_{ij} = 1$ if the bidder bids two or more times, and $INCR_{ij} = 0$ otherwise. Thirty-eight percent of bidders have $INCR_{ij} = 1$, and at least one incremental bidder appears in 79 percent of all auctions.

For every bidder in each true auction, we first estimate the probability that $INCR_{ij} = 1$ with a linear probability model.[28] In this model, we include the same set of auction, seller, and bidder controls as in the analysis of bid timing, including a full set of match-specific fixed effects. Results are reported in column 3 of Table 6. We find that an individual bidder's probability of $INCR_{ij} = 1$ is 3.1 percentage points greater in 100-percent-share auctions than noncharity auctions ($p = 0.09$). This represents an 8.3 percent increase in the probability of a bidder submitting multiple bids relative to the sample average among noncharity auctions.[29] We interpret this result as an increase in (naïve) bidder aggressiveness following early bidding by other bidders.[30] Incremental bidding is no more common in charity auctions with less than 100 percent of revenue donated than in noncharity auctions.

Finally, we estimate whether an auction's winning bidder is likely to have submitted multiple bids. In column 4 of Table 6, we report a significantly increased probability that a 100-percent-share auction is won by the bidder with $INCR_{ij} = 1$. The difference of 8.8 percentage points represents a substantial increase in the probability of this event, as the sample mean for incremental bidders winning non-charity auctions is 38 percent among the included observations. This supports the interpretation that early bidding occurs in charity auctions because of the public goods effect from auction revenue. Early bidding is beneficial to strategic bidders when this behavior induces other bidders to pay more for an item for sale.

D. *Are Pro-Charity Preferences Common Among Bidders?*

The analysis in Section IVA indicates that charity-linked products sell at a premium. While this demonstrates that at least some bidders are willing to pay a charity premium, it does not comment on how common it is for bidders to have a greater willingness to pay for charity-linked products. We address this issue by examining bids below the first- or second-highest in an auction, and by analyzing the bidding behavior of consumers who participated in both charity and noncharity auctions for the same object.

We begin by examining the maximum bid for each unique bidder active in a true auction in the matched data. We rank these maximum bids to identify the second

[28] Probit models produce very similar results, but may produce inconsistent estimates in specifications with unconditional fixed-effects and a small number of observations in each group.

[29] This bidder-level analysis may be too conservative in that once one bidder submits a sequence of incremental bids, the (potential) incremental bidders who begin bidding later are less likely to require multiple bids to reach their maximum willingness to pay.

[30] An alternative explanation is that incremental bidding is observed more frequently in charity auctions simply because these auctions are favored by naïve bidders. If this is true and strategic bidders have $\lambda = 0$, then we would expect strategic bidders to delay their charity bids rather than placing them earlier.

highest bid for a product, the third highest bid, and so on. The value of the winning bidder's bid is not revealed in eBay's reporting of bids. To limit the impact of outlier bids on our analysis, we exclude bids that were less than \$1 or 10 percent of an item's final selling price. With our data on ranked bids, we estimate a variant of equation (1) four times, employing as the dependent variable the log of the k-th highest bid for $k = 2, 3, 4$, and 5. We repeat this analysis with the log of the ranked bid plus the winning bidder's shipping fee. In these analyses, we employ all controls as in equation (1).

We present the results on ranked bids in panel A of Table 7. When $\log(BID)$ is the dependent variable and shipping fees are included as a control, we find that the second-, third-, and fourth-highest charity bids are significantly greater than their noncharity counterparts. The fifth-highest bid in a charity auction is also greater than the fifth-highest bid in a noncharity auction, but this difference is not statistically significant. Differences between charity and noncharity bids are positive, but smaller in magnitude, when $\log(BID + SHIPPING)$ is the dependent variable. In this set of models, the second- and third-highest charity bids are significantly greater at $p < 0.05$, while the fourth-highest auction is greater with $p < 0.10$. In column 4 of Table 7, we provide the average number of unique bidders in the charity and noncharity auctions in which we compare ranked bid amounts. Charity auctions had slightly fewer bidders, on average, than noncharity auctions in each subsample. This suggests that the results in panel A are conservative in that we are observing the top k bids from a larger pool of bidders for the noncharity listings.

We next focus our attention on the subset of consumers who are active in both charity and noncharity auctions for the same item in our sample. This is the same group of consumers whose bid timing choices are analyzed in column 2 of Table 6. This group, as it is defined by active interest in both charity and noncharity versions of the same product, provides additional evidence on whether pro-charity preferences are restricted to a rare or distinct portion of the consumer population. In all of the price and bidding analysis above, the charity premium may have been driven by the activity of consumers who had no interest in bidding on a noncharity version of a product.

As in our analysis of ranked bids, we consider the maximum bid a bidder places in an auction, and we exclude bids that are below \$1 or 10 percent of the product's final price. We estimate a model similar to equation (1) above, but we now include bidder-product fixed effects, α_{jm}, to control for individual bidder j's personal taste for the common product for sale. We use OLS despite the fact that when one of these bidders wins an auction, we do not observe her actual willingness to pay. Rather, we know only that it exceeds the price paid. Additionally, we drop *LENGTH* as a control variable, as it has no meaningful interpretation in this regression. We present the results in panel B of Table 7. In column 1, we show that fixed individual bidders bid 4.7 percent more ($p < 0.05$) for the same item in a charity auction relative to a noncharity auction. The premium is 2.8 percent ($p < 0.10$) when we employ $\log(BID + SHIPPING)$ as the dependent variable. These results, considered in tandem with those of Table 7's panel A, offer some evidence that the charity premium is due to an increase in willingness to pay among a broad set of consumers rather than a small group of consumers who win charity auctions because of their idiosyncratically strong tastes for the associated charity.

Table 7—Charity Premium across the Bid Distribution

Dependent variable	log (bid) (1)	log (bid + shipping) (2)	*N* charity/all (3)	Mean bidder count, charity/noncharity (4)
Panel A. Coefficient estimates for CHARITY by bidder rank				
Second highest bid	0.095***	0.059***	449/1,320	5.61/5.86
	[0.014]	[0.011]		
Third highest bid	0.059**	0.029*	369/1,064	6.11/6.44
	[0.021]	[0.014]		
Fourth highest bid	0.080*	0.039†	279/794	6.85/7.10
	[0.035]	[0.023]		
Fifth highest bid	0.060	0.027	202/552	7.65/7.87
	[0.055]	[0.037]		
Panel B. Bid difference within bidder				
CHARITY	0.047*	0.028†	323/721	
	[0.022]	[0.016]		

Notes: The *CHARITY* variable is coded as 1 if the seller allocated a positive portion of the final sale price to a charity and 0 otherwise. Standard errors are in brackets.
***Significant at the 0.01 percent level.
**Significant at the 1 percent level.
*Significant at the 5 percent level.
†Significant at the 10 percent level.

V. Conclusion

We study whether consumers will pay higher prices for products linked to charities. Most past research on this topic has not addressed this issue with field data on what consumers will actually pay for charity-linked items. This paper contributes to the empirical literature with data that cover a wide variety of products and prices. Organizing a field experiment to recreate the 100-percent-share data alone would require approximately $32,300 to purchase the 429 objects to be sold in these charity auctions.[31] By examining a mechanism (consumer willingness to pay) through which pro-social firm behavior may benefit firms, we also contribute to the empirical literature on corporate social responsibility, which has focused mainly on establishing correlations between corporate financial performance and measures of social responsibility.[32]

The market we study—online auctions at eBay for identical products available with and without a charity component—offers two advantages over studying the same phenomena in retail settings. Although consumers may frequently encounter charity-linked products in their trips to grocery and department stores, pairs of products (and stores themselves) are generally differentiated by more than their charity association. Examining the market prices for fair trade versus conventionally

[31] We assume here that each item could be purchased at its average noncharity price plus shipping charges. It may be possible to obtain and sell the noncharity control objects with no net expense except shipping costs.

[32] See Joshua D. Margolis, Hillary A. Elfenbein, and James P. Walsh (2007) for a review of studies that consider co-movements of CSR and financial performance.

produced coffee, for example, would potentially conflate consumers' preferences for fair trade with differences in perceived quality, the impact of brand, and other factors. Additionally, the richness of the bidding data in this market allows us to discern whether consumers value charity revenue as a public good, a motivation that in retail markets would likely be indistinguishable from warm-glow charity motivations.

We find that, after controlling for differences in auction format and seller characteristics within matched groups of products, auctions with 10 percent of revenue dedicated to charity have full prices that are 5 percent higher than in noncharity auctions. In auctions with 100 percent of revenue dedicated to charity, full prices are 7 percent higher. Additionally, we find evidence that charity premiums decrease with the value of the underlying product, a result that is consistent with consumers having diminishing marginal utility over donations. We find economically significant premiums in 10-percent-share and 100-percent-share auctions even though the empirical setting is one in which consumers are unlikely to enter the market with the intention to find a donation opportunity and the charities chosen by sellers vary widely in scope and appeal. Moreover, the differences in bidding behavior are not concentrated merely among bidders who win and who determine the closing price. The third- and fourth-highest bids are higher in charity auctions than in noncharity auctions, and individuals bidding in charity and noncharity auctions for the same product bid significantly higher in the charity auctions.

We also find that bidders in charity auctions bid earlier than those in noncharity auctions, and in charity auctions we find more incremental bidding. Given the presence of naïve bidders, strategic bidders who value the charity contribution as a public good can increase auction revenue by bidding earlier. This suggests that charity bidders may value the public goods aspect of charity revenue, rather than bidding differences coming only from warm-glow utility that bidders receive from their own charity payments. Our findings raise new questions for researchers about the strategic motivations behind bid timing choices and heterogeneity in these considerations among bidders. Behavioral explanations for these differences, such as consumer distaste for opportunistic sniping in charity settings, may provide fertile ground for future study.

Taken together, our results have implications for firms' social responsibility strategies. Although the estimated 10-percent-share charity premium is not large enough alone to increase seller profit, it does increase willingness to pay, seemingly among a broad set of consumers. Thus, if firms perceive a need for corporate philanthropy—whether for reasons of altruism, political expediency, or brand-building—they may find that charity-linked products are an efficient way to fund these donations. Our result that premiums are greater for lower-value items appears consistent with common practice in charity-linked marketing and charitable fundraising. In charity-linked marketing strategies, for example, we expect to see firms make revenue or profit donation pledges for products that are a small portion of consumers' budgets, while eschewing these pledges for higher-priced items. In the case of charitable fundraising, we conjecture that it is reasonable to see low-price items marketed widely, including to potential customers who may value the charity minimally, while charity auctions for high-value items are most successful when the bidders have a strong personal attachment to the charitable cause (e.g., their own child's school or a favorite museum).

Finally, it is noteworthy for those who study charitable fundraising strategies that demand for charity-linked products is higher than that for noncharity-linked products. Nonetheless, this finding does not, by itself, imply that charity-linked fundraising programs raise more overall revenue. If well-intentioned consumers reduce their own direct donations after purchasing charity-linked products at a premium, then an apparently successful product program could provide no net gain. To evaluate these issues, further data are required to analyze how consumers substitute between charity-linked products and donations, and how product sales attract consumers who would not otherwise make a direct donation to a charity.

Appendix 1: Bounds on Charity Price Premiums

In this Appendix, we present a simple model of price determination in a market where an object is sold both with and without a charity link, and in which consumers have the option to support a charity either through direct donations or charity-linked products. We abstract away from the inter-bidder strategic aspects of charity auctions and instead consider what (fixed) prices consumers are willing to pay. We derive simple conditions on prices which hold in an equilibrium where charity-minded agents purchase charity-linked products while agents with no charitable motivation do not.

Assume that there exists a market in which all agents take prices as fixed. In the market, two independent firms each offer one version of the same physical good, with one firm pledging to donate a share of revenue, $\sigma \in (0, 1]$, to a charitable cause. The other firm makes no charitable donation. The charity-linked version (c) of the good has the price p_c, and the noncharity version (n) has a price of p_n.

Each consumer in the market considers from whom to buy a single unit of the good. For simplicity, we assume that all consumers have identical income, y, and gross utility, v, from one unit of the good. We are interested in the conditions under which a consumer prefers to buy the charity-linked good rather than the noncharity good, so we assume that y and v are sufficiently large relative to p_c and p_n so that all consumers purchase from one firm or the other. To complete the model, we assume the presence of a numeraire good, m, to which consumers devote all income not spent on the object or donations.

Consumers, indexed by i, vary in the utility they receive from transferring d_i dollars of their own income to charity. A consumer may generate d through direct giving (g) or the charity-linked product, so $d = g + \sigma p_c$. This utility is the sum of a consumer's private warm-glow benefit, $w_i(d_i; \Delta)$, from transferring d_i to the charity, plus the public goods benefit, $a_i(D; \lambda)$, from a total of D dollars donated to the charity. We write $D = D_{-i} + d_i$ to separate i's contribution from the total donations of all other consumers in the market. In the spirit of Engers and McManus (2007), w_i depends on the warm-glow parameter Δ, while the altruistic benefit of a_i depends on λ. The functions w and a are increasing and concave in d and D, respectively; increasing in Δ and λ, respectively; and have $w(d;0) = a(D;0) = 0$ and $w(0;\Delta) = a(0;\lambda) = 0$. We divide the consumer population into one group that has no interest in the charitable cause ($\Delta = \lambda = 0$) and a second group with a positive, symmetric taste for the charity ($\Delta \geq 0$ and $\lambda > 0$). To minimize notation, we suppress Δ and λ where possible below.

Consumers pay the tax rate t on income, and direct giving is tax-exempt. For a consumer who purchases a product of type $j \in \{n, c\}$ and donates g, while making the total donation of d, the budget constraint is $p_j + g + m \leq (1-t)\,y + tg$. The elements of the utility function are combined linearly, so after substituting the budget constraint into the objective function, we have $U_{ij} = (1-t)\,y + v + w_i(d_i) + a_i(D_{-i} + d_i) - p_j - (1-t)g_i$.

When dealing with charity-minded consumers, we are interested in the positive contributions they make through direct donations or charity-linked goods, so we focus on settings in which w and a are such that these consumers would choose $d_i > 0$. We do not characterize the equilibrium level of giving, D. A charity-minded consumer who purchases the noncharity good and takes other consumers' donations (D_{-i}) as fixed, sets d_i such that $w_i'(d_i) + a_i'(D_{-i} + d_i) = (1-t)$. Let d_i^* denote the consumer's optimal total donation when all giving is direct, i.e., $g_i = d_i^*$. Given the tax rate t, we may interpret d_i^* as the number of "units" donated while $(1-t)d_i^*$ is spending on donations. A charity-minded consumer's value of d_i^* is increasing in Δ, λ, and t, and decreasing in D_{-i}. Consumers with no interest in the charity have $d_i^* = 0$.

We derive inequality conditions on p_n and p_c that insure that charity-minded consumers are willing to pay p_c, while consumers with $\Delta = \lambda = 0$ remain in the noncharity market. The latter occurs as long as $p_c \geq p_n$, or $(p_c - p_n)/p_n \geq 0$ in percentage terms. The upper bound on charity prices depends on consumers' preferences, the share of revenue donated by the firm, and relative prices.

If a consumer purchases the charity-linked product, he makes an implicit donation of σp_c to which he may add a direct donation if desired. When $\sigma p_c \leq d_i^*$, the marginal value of topping-off the donation is greater than the price, $(1-t)$, and the consumer directly donates $g_i = d_i^* - \sigma p_c$ to achieve a total donation of d_i^*. The charity-minded consumer is content to participate in the charity-linked market if $U_{ic} \geq U_{in}$, which holds when $p_n \geq [1-(1-t)\sigma]p_c$. The maximum percentage premium a charitable consumer will pay is $\varphi = (1-t)\sigma/[1-(1-t)\sigma]$, with $p_c = (1+\varphi)p_n$. When all product revenue is donated to charity ($\sigma = 1$), φ depends on the size of the tax rate, t. The tax benefits of direct donations are insufficient alone to draw consumers into the noncharity market, as the charity-linked product allows consumers to receive utility from two sources (the product and the donation) with a single transaction. If the tax rate is zero while $\sigma = 1$, then φ explodes, and it is worthwhile for consumers to pay any charity premium as long as $\sigma p_c < d_i^*$. For auctions with $\sigma = 0.10$, which are common in our data, the bound φ offers a sharper empirical prediction. With no tax benefit from direct donations, the bound on charity prices is 11 percent. With a tax rate of $t = 0.28$, φ shrinks to 7.8 percent. In these cases, as long as the charity seller is willing to "share" some of the donation expense with the consumer (e.g., a 7 percent price premium for a 10 percent donation), the consumer is willing to forego tax-deductible direct donations.

When $\sigma p_c > d_i^*$, the consumer makes no additional donation. Let z represent the excess donation above $d_i^*, z = \sigma p_c - d_i^*$, and define the function μ to be the consumer's benefit from z:

$$\mu(z) = w(\sigma p_c) + a(D_{-i} + \sigma p_c) - w(d_i^*) - a(D_{-i} + d_i^*).$$

Due to the properties of w, a, and how the charitable consumer chooses d^*, the function μ is positive, increasing, and concave with $\mu(0) = 0$ and $\mu'(z) < (1 - t)$ for $z > 0$. A charitable consumer prefers the charity-linked object when $(1 - t)d_i^* + \mu(z) \geq p_c - p_n$. That is, the charity price must not exceed p_n by the potential savings from avoided out-of-pocket donations, $(1 - t)d_i^*$, plus the utility benefit of the excess donation, $\mu(z)$. In this case, the maximum percentage charity premium, φ, is defined implicitly by

$$\frac{(1 - t)d_i^*}{p_n} + \frac{\mu[\sigma(1 + \varphi)p_n - d_i^*]}{p_n} - \varphi = 0.$$

Writing this expression as $F(p_n, \varphi) = 0$, we can show that φ is decreasing in p_n using the implicit function theorem, which implies $(\partial\varphi/\partial p_n) = -(F_{p_n}(\varphi, p_n))/(F_\varphi(\varphi, p_n))$. The properties of μ imply that both F_φ and F_{p_n} are negative. $F_\varphi = \sigma\mu'(z) - 1$, which is negative because $\sigma \leq 1$ and $\mu' < 1$ for $z > 0$. The term F_{p_n} is proportional to $-\{[(1 - t) - \mu'(z)]d_i^* + [\mu(z) - z\mu'(z)]\}$. Within the braces, the first term is positive because $(1 - t) > \mu'(z)$. The second term is positive because $\mu(z) - z\mu'(z) = 0$ when $z = 0$, and strictly increasing in z because μ is concave. Thus, holding fixed charity preferences by the consumers, the bound φ decreases in the price, p_n, of the noncharity item.

In this model, warm-glow preferences $(\Delta > 0)$ support a positive charity premium, but are not necessary. Consumers with purely altruistic preferences will pay a charity premium if $d_i^* > 0$, although their maximum premium will decrease with D_{-i} because the marginal value of the consumer's own donation, $a_i'(D_{-i} + d_i)$, falls. If we were to expand the model to include potential donors who were uninterested in the charity-linked product for its own sake $(v = 0)$, then an increase in the charity-linked product's sales could further diminish direct giving, and similarly, an increase in direct giving could decrease demand for the charity-linked product. Considering the equilibrium in such a model is a worthwhile task but beyond the scope of this paper.

Appendix 2: The Matching Process

In this Appendix, we describe how we identified and matched the eBay auctions in our data. Although there are thousands of active eBay Giving Works auctions at any moment, relatively few of them are useful within an efficient and precise matching process. For example, there are many pieces of original artwork listed as Giving Works auctions, but, in general, it is impossible to match them to identical noncharity items. To search for potentially useful charity auctions in an efficient way, we divided the main eBay product categories among ourselves and two research assistants (RAs). Product categories include classifications like "Consumer Electronics," "Cameras and Photo," and "DVDs and Movies." Each person was instructed to monitor a group of product categories and search for charity auctions that might be matched to simultaneously open, noncharity auctions. In practice, this meant looking for products that were new or nearly new and were not often bundled with many accessories. For example, it was easy to match DVDs because it is standard on eBay to describe DVD condition with a few clear phrases ("new and sealed," "viewed once," "no scratches") and to provide a UPC code that identifies the DVD's edition, screen format, and other details. On the other hand, while there is a large market for film cameras on eBay, it is generally difficult to find a pair of cameras that match in body model; lens model; the condition of the body and lens; and the presence of instruction manuals, cases, straps, and other accessories.

In matching a Giving Works auction to a noncharity auction, we considered only the physical characteristics of the product for sale to create an acceptable match. This means that within a "match" there are other attributes of the auction that are not identical. Sellers' characteristics, such as reputation score and feedback rating, are not matched. Similarly, neither the appearance of an auction listing (amounts of text and pictures) nor its ending time is matched. Including even one of these characteristics in the matching process would substantially reduce the amount of usable data. Instead, we record information on these auction details and include them as control variables in our empirical analysis. In this way, we are able to account for some variation in prices within our matches through the influence of these variables.

Our matching process covered eBay listings that closed between March and December 2006. We identified the auctions in two ways. First, we searched eBay's listings of currently open Giving Works auctions, and then, after finding a potentially promising charity auction, we would search eBay noncharity listings. Second, we used eBay's Marketplace Research program to search eBay's archived data for matching charity and noncharity auctions. About half of our data come from each search method. Within each search process, we recorded the auction identification numbers of up to five matching noncharity auctions that had closing times within five days of the charity auction's ending time. We were unable to use an automated program to generate matched data because important product characteristic information is often conveyed through pictures and through pieces of text that are particular to specific categories.

Our procedures, as executed by research assistants and ourselves, returned a set of 5,458 auctions organized around 1,568 charity auctions. We visually inspected each auction associated with a potential match to insure that all auctions in our sample met the criterion of identical product characteristics. These inspections lead us to reject 1,300 proposed matches between charity and noncharity items, and reduced the set of observations to 3,642 auctions including 1,049 Giving Works auctions. See Table A1 for examples of auctions brought to us as potential matches that we rejected for being insufficiently similar in product characteristics.

We further reduced the set of matched auctions by eliminating items that closed at very low prices. We drop all auctions for which the final price is $2 or less, and we exclude all auctions within a matched cluster if the average price across the

Table A1—Examples of Rejected Matches

Giving Works auction	Rejected match
$100 Office Depot Gift Card with no expiration date	Card value given as $100 in auction title, but $99.62 in details
First season of "Home Improvement" on three DVDs in factory-sealed packaging	DVD set described as new, but not in sealed packaging
Callaway Great Big Bertha Warbird Driver Golf Club with 10º face angle	Same club model but with 11º face angle
Canon EOS Rebel GII 35mm Film Camera with 80–200 Zoom Lens	Same camera body but with 28–90 lens
Bun and Thigh Roller Exercise Machine with no accessories	Also includes instructional video and exercise guide

set of observations is less than $5 before shipping charges are included. Given our empirical approach, described in Section IV, these observations may yield deceptively large percentage charity premiums despite the premium having a small absolute magnitude. After dropping these items with low closing prices, we are left with 2,433 total auctions organized around 723 charity items. These are the data with which we perform our empirical analysis.

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