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Effects of the price of charitable giving: Evidence from an online crowdfunding platform☆

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ABSTRACT

A long literature has examined the effects of the price of giving – that is, the amount an individual must give for one dollar to accrue to the charitable activity itself – on donative behavior. We use data from DonorsChoose.org, an online platform linking teachers with prospective donors that are uniquely suited to addressing this question due to exogenous variation in overhead costs. An increased price of giving results in a lower likelihood of a project being funded. We also calculate the price elasticity of giving, finding estimates between −0.8 and −2. Finally, we examine the effect of competition on giving and find that increased competition reduces the likelihood of a project being funded. These results provide insight into the workings of the market for charitable gifts.

1. Introduction

The determinants of donations to charitable organizations are of deep interest to both practitioners and policymakers. The effects of the price of giving – that is, the amount a donor needs to give in order to provide one dollar of the charity's output – are of particular interest.[1] Third-party ratings organizations like Guide Star use the fundraising and administrative ratios that affect this price in determining how to rank charities, which has been shown to affect donors' decisions (e.g. Grant (2010) and Yoruk (2012)). The advent of the Internet means that this information is far more available to prospective donors than in the past. On a closely related point, there is extensive policy discussion on the tax treatment of charitable giving; the Congressional Budget Office estimates that the charitable giving deduction reduced Federal revenues by $40.6 billion in 2006 (Congressional Budget Office, 2011). This price may deviate from par due to tax preferences (e.g. Auten et al. (2002), Bakija and Bradley (2011)), overhead and fundraising costs (e.g. Weisbrod and Dominguez (1986), Ribar and Wilhelm (2002)), or through direct matching and rebates (e.g. Eckel and Grossman (2003), Huck and Rasul (2011)).

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[1] The standard definition for the price of an individual's giving to a particular charity (e.g. Weisbrod and Dominguez (1986)) is $P_{ic} = (1 - t_i)/(1 + a_c)$; this is the price faced by individual i giving to charity c, this is the denominator, where ac is the share of charity c's expenses used for fundraising and administrative costs. Those who focus on the tax treatment of giving generally assume that the denominator equals one; we refer to this measure as the "tax price of giving." Those who focus on fundraising and administrative costs generally assume that the numerator equals one; we refer to this measure as the "efficiency price of giving."

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0167-2681/

While most (but not all) of the authors across the different strands of the literature agree that the price of giving affects charitable giving,[2] the estimated magnitudes vary widely, and many approaches struggle to cleanly identify these effects. For example, a charity that spends a large share of its revenue on fundraising will have a relatively high price of giving – potentially reducing donations – yet those same fundraising expenditures may attract more and larger donations. The charities being compared in these studies may also differ greatly in unobservable attributes; further, the degree to which donors pay attention to these prices, particular when arising from overhead and fundraising costs, is uncertain. The existing literature has almost exclusively relied on annual data at the charity level, calculating the price of giving using the previous year's data and estimating its effect on current-year donations. Given these endogeneity, salience, and timing issues, it is unclear whether these estimates truly reflect donors' responses to the price of giving.

This paper uses data from DonorsChoose.org, an online platform that allows public school teachers to raise funds for projects, that are uniquely suited to addressing the effect of price on charitable giving. The structure of DonorsChoose is such that the issues that have been problematic in previous work are unlikely to affect estimation. First, the fees that the organization adds to teachers' requests should not draw in more donations, as fundraising expenditures might – that is, they are overhead costs. As described in Section 4.2, the variation in these fees is exogenous and provides the identification for the price of giving. Second, the fees are clearly labeled on the web page and, as such, are explicit and salient. Third, the projects are close substitutes with standardized requests presented to donors. Fourth, the structure of the threshold good is such that the average and marginal price of giving are explicitly equated, addressing Steinberg's (1986) critique that average prices are an inappropriate measure. Finally, to ensure quality, DonorsChoose fulfills the requests through its network of vendors directly; teachers have very limited ability to affect the price of giving.

By estimating the effect of the price of giving on the probability that a project receives any funding, its donations conditional on receiving any, and the likelihood that its funding request is fully met, this paper adds to the existing literature on donors' distaste for administrative costs. We find that the efficiency price of giving has a strong impact on the likelihood that a project achieves its funding goal. Estimates of the elasticity of giving range from −0.8 to −2, depending on the sample and specification, in line with much of the previous literature.

We also examine the effect of competition on charitable giving, a deeply important question that has received little attention in the literature.[3] With 1.1 million tax-exempt charities in the United States in 2011 (Barton (2012)), more knowledge on the role of competition and substitution between charities is vital for developing a more thorough understanding of the market for charitable giving. We find large, positive, and significant cross-price elasticities for DonorsChoose projects, as well as a strongly negative effect of having additional similar projects competing for donations. These results provide evidence on the workings of the market for charitable gifts.

In addition, this paper adds to a burgeoning literature on crowd funding, an increasingly popular form of raising funds. Kickstarter.com, a leading crowd funding website, crossed the $1 billion threshold in March 2014, and the recently released film *Veronica Mars* was sparked by $5.7 million raised from fans. Important in their own right, these platforms also provide an excellent framework for examining important questions in philanthropy (see, for example, Agrawal et al. (2011) and Burtch et al. (2013)).

Section 2 describes prior research on efficiency prices, tax prices, and matching in charitable giving. Section 3 discusses the economic framework and, in particular, how the DonorsChoose process allows for clean identification of the effect of efficiency prices. Section 4 discusses the data and econometric specification, Section 5 presents the results, and Section 6 concludes.

2. Previous literature

Prior research on the effect of price on giving tends to fall into three broad groups: the role of administrative and fundraising costs; the role of tax preferences; and the role of direct subsidies to giving, generally in field experiments. This paper primarily relates to the first group.

The literature on fundraising and administrative costs has primarily concerned itself with the question of how donors react to the share of a charity's revenues that are dedicated to fundraising expenditures; Bowman (2006) provides a thorough review. As mentioned in Section 1, this is a difficult relationship to untangle, as extensive fundraising activities may reduce donations from donors who dislike those expenditures, increase donations from donors who give more because of the activities financed by those expenditures, or perhaps even increase donations from those who appreciate the use of their gift to increase giving from others (Rose-Ackerman, 1982). Weisbrod and Dominguez (1986) directly tackle the question of the price of giving, defining it as the cost to the donor of providing a dollar of output by the charity, and estimate the effect of this efficiency price on giving using a panel of IRS filings by charities. They find elasticities ranging between −0.7 and −2.6, depending on the function of the charity, with most estimates close to −1. However, their econometric approach does not address the potential endogeneity of fundraising expenditures. Okten and Weisbrod (2000) extend this analysis, using first

[2] Steinberg (1986) argues that the price of giving, being a measure of an average, is irrelevant to the decision to make a small donation relative to total contributions.

[3] Two notable exceptions are Reinstein (2000), who finds that charities are substitutes for each other and Lange and Stocking (2012), who conduct a field experiment and find that contributors to one charity who were exposed to a second charity gave more to both.

differences to account for organization-specific effects and lagged variable as instruments to account for the endogeneity of the price variable. They find small but significant price elasticities, around −0.2, for hospitals and higher education, but a large elasticity of −2.6 for scientific research.

Bowman (2006) uses data from a set of workplace giving campaigns in which donors were provided with overhead ratios; this study thus avoids the need to assume that donors make the effort to inform themselves. As Bowman says, "it strains credulity that a preponderance of donors would do the necessary research on a charity's cost structure." Using a first-differences approach, Bowman finds large, negative price elasticities of giving, greater than −2, along with a decrease in the number of donors giving to charities with higher prices. Nunnenkamp and Öhler (2011) echo Bowman (2006) in arguing that "donors hardly make use of publicly available information. . . when deciding on donations," finding negative but insignificant coefficients on the price of giving. A number of other papers have found negative effects of price (Jacobs and Marudas, 2009; Khanna and Sandler, 2000; Marudas and Jacobs, 2004, inter alia), though the magnitude and significance often vary by specification. On the other hand, Ribar and Wilhelm (2002), in modeling crowding out and altruism, find – counter intuitively – positive effects for the charity's own efficiency price. In addition, they also include the prices of other, similar organizations and find large, positive cross-price elasticities.

Steinberg (1986) takes a different tack, arguing that fundraising ratios and the average price of giving are irrelevant. He shows that an optimizing charity will spend a small marginal contribution entirely on programming, irrespective of the overhead ratio. Therefore, the average price (most studies assume that donors focus on the average price or average overhead ratio, since that is what is commonly reported) does not provide donors with useful information on the charity's productivity. He finds no relationship between the standard efficiency price of giving and donations using a panel of IRS filings, though an estimated measure of the marginal product of fundraising did have an effect on giving.

An extensive literature has addressed a different determinant of the price of giving, namely, the effect of tax preferences, which reduce the price of a dollar of giving to below one (unlike administrative and fundraising costs, which increase the price of giving).[4] As seen in equation (1), for an individual who itemizes on his or her tax return, the deductibility of charitable donations reduces the price of a dollar of giving to $(1 - t)$, where t is the marginal tax rate faced by individual i. As noted by Clotfelter (1985) and Steinberg (1990), early work in this area generally found that giving is relatively elastic with respect to its tax price, though Steinberg points out that some estimates using panel data find lower elasticities. In more recent work, a meta-analysis by Peloza and Steel (2005) finds a weighted mean of −1.4, with estimates from panel data or actual tax filers closer to −1. Recent work by Auten et al. (2002), using tax return data, finds elasticities ranging around −1 for permanent price changes and around −0.5 for transitory price changes, while Brooks (2007) uses survey data and finds substantial variation in price elasticities depending on the focus of the charity, from −0.6 for health charities to −1.4 for social welfare organizations. Bakija and Bradley (2011), using a panel of taxpayers and identifying from differences in state tax policies, find negative price elasticities greater than one in absolute value.

A third strand of the literature directly addresses the effect of price changes on giving behavior by altering subsidy rates in laboratory or field experiments. The price of giving in these experiments is closer in spirit to the efficiency price, as subjects are choosing to give to just one charity whose price has been altered (as opposed to giving to any charity, as through changes in the tax price), though of course the price resulting from a subsidy is less than one. Karlan and List (2007) conduct a field experiment showing that the existence of a match affects the probability of responding to a solicitation, but that the match rate itself (that is, the actual price of giving) has no additional effect. However, Huck and Rasul (2011) find no effect of matching on the probability of responding relative to a control treatment with a lead donor, and larger gifts conditional on giving only from the higher of the two match rates used in the experiment. On the laboratory side, Eckel and Grossman (2003) find negative price elasticities around −1.1 when subjects' giving is matched. Extensions of this experiment in both the lab (Eckel and Grossman, 2006) and the field (Eckel and Grossman, 2008) found similar or larger (in absolute value) match price elasticities.

It seems, therefore, that the bulk of the literature on this subject finds price elasticities of giving around −1, though estimates vary substantially. This paper provides insight into these issues in a context that allows for cleaner estimation, as well as further evidence on cross-price elasticities and competition.

3. Economic framework and the structure of DonorsChoose.org

Several recurring issues emerge from the existing literature in Section 2. First, a number of researchers question whether donors avail themselves of information on overhead costs at all. Given that a recent survey found that only 35 percent of donors do any research before giving (Hope Consulting, 2012), this is a valid concern – though among those who did research, the most commonly sought information was some type of overhead ratio, and two-thirds were seeking some sort of information related to efficiency. Second, there are concerns regarding the endogeneity of, in particular, fundraising expenditures. Donors may dislike high fundraising expenditures, but more intensive solicitation may raise more funds. Third, timing is an issue. Most researchers use lagged expenditures or price, since contemporaneous measures are not yet observable to potential donors – but it is not entirely clear whether one lag is the correct approach. Fourth, there is a great deal of heterogeneity across charity types, and inference is often drawn using relatively small sample sizes of several hundred

[4] Clotfelter (2012) has a thorough discussion of the role of the charitable giving deduction in the United States.

(or fewer) charities. Finally, as Steinberg (1986) argues, sophisticated donors should not be concerned with average prices. Fortunately, DonorsChoose.org is organized in such a way that these concerns are not applicable; thus, this paper provides cleaner estimates of the effects of the price of giving.

DonorsChoose.org, founded in 2000, is an online platform that allows public school teachers in the United States to post requests for funding.[5] Donors, whose gifts are tax-deductible, can easily select projects to which to donate. The platform has raised about 160 million dollars from nearly a million donors, for over 130,000 teachers in 46,000 schools. About 40 percent of projects request classroom supplies, 25 percent request books, and 27 percent request some type of technology.

A teacher selects supplies from lists of approved vendors (no requests for labor or capital improvements may be submitted). He or she writes several paragraphs regarding student needs and the purpose of the supplies, as well as posting a photograph of the classroom and students. The request's web page includes information about the school (such as its location and poverty level) and the project (such as its subject matter and the number of students reached). Importantly, the request includes an itemized list of the materials requested, their price and quantity, and any additional charges, such as shipping, sales tax, payment processing fees, fulfillment fees, and optional support for DonorsChoose.org (all described in further detail in Section 4). A sample request is shown in the Online Appendix in Figure A1 (note that a request page will also include notes from those who have already donated to the project);[6] these projects are screened by the organization's staff. In general, projects expire after five months (prior to 2008, the expiration period was eight months). If a project is funded, DonorsChoose purchases the materials and ships them directly to the teacher to ensure quality. If the project expires prior to being funded, donors have the option to have the funds returned to their account (to select another project) or to have DonorsChoose select a project for them.

One crucial point is the relationship between the elasticity of giving with respect to the tax price and its counterpart, the elasticity of giving with respect to the efficiency price. These two strands of the literature have, to the best of our knowledge, remained completely separate. Those addressing the efficiency price of giving assume away differences in donors' marginal tax rates when examining aggregate giving to a charity. This is a sensible assumption as long as those who itemize their deductions or are in higher tax brackets do not systematically give to certain charities.[7] However, given the evidence on socio economic status and giving preferences (e.g. Center on Philanthropy, 2007), this assumption may not be valid. For example, in 2005, households earning less than $100,000 directed approximately two-thirds of their giving to religious organizations and just 0.3 percent to education. Meanwhile, those earning between $200,000 and one million dollars directed 23 percent to religious groups and 32 percent to education. To the extent that these sectors have different prices, perhaps because of the nature of their work, estimates that ignore marginal tax rates introduce measurement error. If, as Lin et al. (2012) find, tax price elasticities vary substantially across the income distribution, previous research may have misattributed these differences to different sectors of charities when in fact they were driven by income. Panel data incorporating charity-level fixed effects will be less susceptible to this problem.

Those addressing the tax price of giving, in turn, abstract away from the denominator, assuming that only the marginal tax rate affects the price of giving. In general, taxpayer data do not contain information on the actual charities to which donors give. Brooks (2007), however, using the Panel Study of Income Dynamics, finds some heterogeneity in the tax price of giving across sectors. This may reflect different price sensitivity to different types of charities, though it may just as well be a product of differing efficiency prices; Okten and Weisbrod (2000) document substantial variation in prices across non profit sectors.[8]

Since we do not have information on individual donors, we are forced to make the same assumption as others in the efficiency price literature. In our case, though, there is no reason to believe that donors systematically sort into certain projects, conditional on the observable attributes of those projects; this is another advantage of the DonorsChoose data. Given that the results including school or teacher fixed effects are similar to those that do not include these controls, this does not appear to be a major concern.

[5] See http://www.donorschoose.org/ about for more information.

[6] DonorsChoose.org made some changes to the layout of project pages after the data for this project was collected. The screen capture shown here is of the new layout, which does not differ greatly from the old style in terms of the presentation of price- and project-related information.

[7] If the log of the price of giving is used in a model with charity-specific fixed effects, the numerator will be subsumed into the constant.

[8] We can also posit a possible relationship between the efficiency and tax prices of giving. Without making restrictive assumptions on donors' utility functions, it is difficult to ascertain an explicit relationship. However, a simple observation allows for the intuitive conclusion that the efficiency price elasticity of giving will be larger than the tax price elasticity of giving: namely, DonorsChoose.org closely resembles a monopolistic competitive market. As in Hart (1985), there are many firms (in this case, projects), producing differentiated goods; firms can ignore their impact on other firms; and there is free entry. With thousands of projects active and seeking donations at any given time, each with its own attributes, the first condition is clearly met. The second condition is somewhat more difficult to translate into this market, but since prices are exogenously given (and fixed over the duration of a project), it is evident that there will not be strategic interactions between the price of giving to different projects. Finally, as described above, entry is effectively unlimited into this market, meeting the third condition. As found in standard microeconomics textbooks, the demand curve for a firm in monopolistic competition is more elastic than that of a monopolist who, of course, faces the industry's demand curve. The relevant price for an individual project is the efficiency price, since there is no sorting by donors based on the tax price. The relevant price for all charitable giving (that is, the industry) is the tax price, since it applies to all charities equally (conditional on the donors' characteristics). Intuitively, education charities are closer substitutes for each other than charities in other sectors (for instance, religious organizations) but these are closer substitutes for each other than all charitable giving is to other forms of consumption. Potential donors have many options and may be relatively price sensitive when choosing among charities, but less sensitive to the decision of how much to give to charity in total. (We are grateful to Jennifer Doleac for this insight.) Therefore, the elasticity of total giving with respect to the tax price will tend to be lower than the elasticity of total giving to a single charity with respect to its efficiency price.

Table 1
Summary statistics.

	Mean	Standard deviation
Funded	0.694	0.461
Price	1.444	0.105
Project cost (2012 dollars)	454.28	17,956
Any sales tax	0.502	0.500
Sales tax (2012 dollars)	14.76	37.79
Had shipping charges	0.722	0.448
Shipping charges (2012 dollars)	24.62	87.77
Optional support (2012 dollars)	103.18	3942
Payment processing fee (2012 dollars)	7.50	21.84
Labor and fulfillment fee (2012 dollars)	26.84	10.72
Total donations (2012 dollars)	368.12	540.53
Percent funded	0.705	0.426
Any donors	0.843	0.364
Number of donors	4.39	6.43

Summary statistics are listed for 371,906 projects, excepting those under competing projects, which are for 358,474 projects.

4. Data and econometric specifications

4.1. Data

The DonorsChoose.org data extract consists of 438,234 projects posted between September 2002 and August 2012. 35,093 of these projects are missing values for variables used to construct the price of giving, including nearly all of the projects posted prior to 2007; we therefore only use projects posted in 2007 onwards. Projects that were still active and collecting donations at the time of the data extract are dropped (16,489), along with those listed as "reallocated" (4038), a designation that can mean that the teacher chose not to receive supplies from a funded project or that DonorsChoose.org chose to remove the project from its website. Since it is difficult to know the precise outcome of these projects, they are removed from the sample; including them does not affect the results in a meaningful way. Projects with missing covariates are also dropped, leaving 371,906 observations, of which 258,251 (69.4 percent) are funded; 84.3 percent of projects had any donations. The mean total project request size is $631, with a median of $490 (in 2012 dollars, adjusted using the CPI). The mean number of projects per school is 8.7; each teacher posts, on average, 2.5 projects. Summary statistics are provided in Table 1, with an extended list of project characteristic summary statistics in Table A1 of the Online Appendix.

The primary variable of interest is the efficiency price of giving – namely, the amount that has to be given so that one dollar accrues to the actual program supported by the charity. The total cost of a project is the cost of the project itself, plus a fulfillment labor and materials fee, sales tax (if charged by the vendor), shipping and handling fees (if charged by the vendor), a payment processing fee, and optional support for DonorsChoose.org. The fulfillment labor and materials fee is a fixed fee that has varied over time and covers the vetting and processing of a project, along with the postage and materials for thank-you notes sent from students. The payment processing fee is a fixed percentage of the project that has varied over time. Optional support has varied over time as a percent of the total project cost; the percent is set by DonorsChoose. Importantly, the option to give additional support belongs to donors, not the teachers. If a donor chooses not to give the full amount of optional support, the remaining amount is updated; that is, later donors do not make up the difference.[9] The efficiency price is therefore the total cost of the project, inclusive of all fees, over the cost of the project itself.

When discussing the effect of competition on giving, it is not obvious how the market of competing projects should be defined. DonorsChoose.org has thousands – and sometimes tens of thousands – of live projects at any given time. It stands to reason that users are not considering every possible project. Based on search data on the DonorsChoose website during 2010, about 55% of searches or filters involve a geographic restriction and 29% involve a subject-area restriction (16% have both), far more than any other search criteria. Therefore, we make two assumptions: first, that potential donors never log on to the web site and decide not to make a gift, and that the set of projects being considered are ones in the same state and subject as the project that was actually chosen. While these assumptions are somewhat arbitrary, they are necessary for tractability.

The number of competing projects is calculated by taking the average number of other projects with the same state and subject area that are live on each day between a project's posting and its completion or expiration. For example, if a project is live for ten days, and in five of those days, there are ten other projects with the same state and subject area is live, and in the other five days there are twenty such projects, this measure would equal fifteen. Similarly, the mean price of other projects is taken by calculating the average price for other projects, weighted by the number of days that they overlapped with the project in question.

[9] 89% of donations included at least some optional support; of these donations, 97.1% gave the full requested amount. The results do not differ qualitatively when the price of giving is calculated without optional support included.

4.2. Identification

It is useful to consider what the ideal experiment would be to answer this question. Charities would be randomly assigned efficiency prices, without any ability by the organizations to influence these amounts. The structure of the experiment would be such that donors were clearly aware of these prices before making their decision on which projects to fund. This experiment would take place over a short time frame to alleviate concerns over lagging information. Any differences in funding behavior would then be attributable to differences in efficiency prices.

The DonorsChoose framework laid out in Section 3 is a reasonable approximation to this ideal. First, the fees are explicit and salient – donors may choose to ignore them, but they do not face any meaningful costs to acquire that information. Second, the overhead costs are purely to meet administrative expenses; the money is not spent on promoting the project. As such, there are no endogeneity issues regarding the fundraising; that is, the fees should not draw in more donations for that particular project, as fundraising expenditures might. Moreover, since teachers do not select the vendors, there is no scope for affecting the price of giving from their side.[10] Third, projects are funded (or expire) in a relatively short time and the price of giving does not change, alleviating any concerns about timing and lags. Fourth, the projects – that is, the "charities" – tend to be very similar (with a large number of control variables to account for any differences, as well) and fairly close substitutes for one another, with standardized requests presented to donors.

The effect of the price of giving on funding outcomes is identified through variation in the payment processing, optional support, and fulfillment fees described above; along with sales taxes and shipping fees charged by vendors. The payment processing and optional support fees are a percentage of the project cost; if there was no variation over time in these fees, they would be subsumed into the time effects. However, the optional support fee changed twice over the course of our data and the payment processing fee changed once. The fulfillment fee, a fixed amount, changed three times in the time covered by the data. In addition, this fee affects the efficiency price of different-sized projects differently. The changes affected only newly posted projects; therefore, for nearly half a year after each change was implemented, active projects that might be otherwise identical had different fee levels.

Other sources of variation are the vendors' tax and shipping rates. 49.9 percent of projects had sales tax added, with a mean rate of 0.071 (s.d. = 0.025). Since the addition of sales tax generally depends on whether vendor has a physical presence in the receiving state (as well as whether the school is exempt from sales taxes), there is within-state variation in this measure.[11] 71.7 percent of projects had shipping charges added, with a mean of 0.083 of the project cost (s.d. = 0.033). Since materials are available only from the vendors selected by DonorsChoose, teachers have little control over the level of these fees. Altogether, differences in these overhead costs combine to provide variation in efficiency prices for otherwise-identical projects.[12]

Another plausible worry is that certain teachers have attributes that affect both the efficiency prices of their projects and their likelihood of being funded. While teachers' ability to affect the efficiency price conditional on the observables of the project is limited, it is possible that some unobservables are leading to spurious correlation between efficiency prices and funding outcomes. For instance, a particularly savvy teacher may be strategic in posting projects with low overhead ratios as well as tapping into a network of donors. To address these concerns, the specifications in Section 4.3 are augmented with teacher fixed effects; the results, discussed in Section 5, do not differ meaningfully from those without teacher fixed effects. In a similar vein, givers may be less sensitive to price when giving through social networks. DonorsChoose's "Giving Pages" allow individuals to promote projects that appeal to them and ask others to support those projects. Removing gifts made through giving pages yields results (available on request) that are essentially unchanged to those discussed in Section 5. Taken together, this is suggestive evidence that there is no meaningful correlation between unobservable determinants of funding and the efficiency price.

It is also important to note that about 5 percent of gifts at DonorsChoose are made by foundation and corporate partners. Since the decision process for these gifts is likely to be different than that for individuals, we also present results excluding gifts from these donors. That is, we sum the total donations from all non-partner donors in order to calculate Donation$_i$. Further, a large number of the remaining donations (about 59 percent) are marked as "no cash received." This can mean that a donor used a gift card – DonorsChoose has issued nearly 75,000 gift cards totaling nearly $9 million, with many of these cards given out as promotions by companies. Alternatively, the donor could have had a balance in his or her account. Since, once again, it is possible that the process by which donations are made from a more salient and immediate form of payment[13] are different from those using dollars that are restricted to be used at DonorsChoose and may seem like "found

[10] Teachers who have successfully completed projects and abided by DonorsChoose's rules in a punctual manner are given more latitude in the size of their requests and, importantly, the ability to make a Special Request from a vendor not affiliated with DonorsChoose. As such, there may be more scope for affecting the price of giving; however, the results of estimates excluding Special Request projects do not differ greatly from the results in Section 5.

[11] The average state-level standard error in a binary variable for whether tax was charged is 0.11, with only four states having no variation in this measure. The average state-level standard error in the tax rate, conditional on tax being charged, was 0.039.

[12] It is possible that donors view different components of overhead costs differently – perhaps viewing shipping fees and taxes as a necessary part of the project, but DonorsChoose's fees are more off-putting. For some outcomes, such as the probability of being funded, donors appear to be more sensitive to the price arising from DonorsChoose's fees, but for others, the opposite is true. It is therefore difficult to draw any meaningful conclusions from this exercise.

[13] Options include transfers through Amazon, PayPal, a credit card, or by check.

money," or money that has already been earmarked in the donor's mind, we also sum up donations for a given project only from these "cash" payments and present those results as well.

Finally, even if donors are sophisticated and consider only the marginal price of giving, as Steinberg (1986) argues, DonorsChoose projects are structured so that the average and marginal prices are equated. That is, the project can only be funded if it meets its full amount requested, so a marginal dollar is divided among program and overhead costs the same way as an average dollar. Of course, donors might believe that their particular donation is being used entirely for the project itself; if that is the case, then the price of giving should have no effect on donative behavior.

4.3. Specifications

Given that these projects are threshold goods (that is, the project is not funded unless the threshold is met), a natural specification to consider is their likelihood of being funded:[14]

$$P(\text{Fund}_i = 1) = \beta_1 \cdot \text{Log price}_i + \beta_2 \cdot \text{Project cost}_i + \beta_3 \cdot \text{Project characteristics}_i + \beta_4 \cdot \text{School characteristics}_i + \beta_5 \cdot \text{Teacher characteristics}_i + \beta_6 \cdot \text{Time effects}_i + \varepsilon_i \quad (1)$$

Eq. (1) is estimated with ordinary least squares; the cost of the project (excluding any overhead costs) is included to control for the different responses to projects of varying size – large projects require, by definition, more donations to fund, but large projects may also attract more donors due to their scale and ambition. Including this control allows us to interpret the coefficient on the log price of giving as being the effect of varying the efficiency price, holding the size of the project fixed. Note, though, that the price of giving is a ratio that includes the project cost in its calculation. It is therefore difficult to interpret the coefficient on project cost; it is included solely as a control. Note also that we take the log of price. This allows for a clearer comparison with the previous literature, particularly when turning to the elasticity of total giving; results using the level of price are similar to those using the log of the price.

Project characteristics, school characteristics, and teacher characteristics are listed in Table A1; the specification also includes the school's state to account for possible location effects. Time effects include the calendar year in which the project was posted, mostly to account for the increasing popularity of DonorsChoose, and the month in which the project was posted, to account for changes in the supply of and demand for donations around the school year.[15] Alternate specifications use teacher fixed effects to account for the possibility that there are unobserved characteristics of the project correlated with the teacher that affect the likelihood of the project being funded.[16] As seen in Section 5, this is not the case (the results are similar with school fixed effects). Robust standard errors, without clustering, are used; clustering at either the school or teacher level does not greatly affect the standard errors.

Among the 30.5 percent of projects that are not funded, 51.3 received no donations at all. The second outcome we examine is the probability of receiving any donations, conditional on not reaching full funding:

$$P(\text{Any donations}_i = 1) = \beta_1 \cdot \text{Log price}_i + \beta_2 \cdot \text{Project cost}_i + \beta_3 \cdot \text{Project characteristics}_i + \beta_4 \cdot \text{School characteristics}_i + \beta_5 \cdot \text{Teacher characteristics}_i + \beta_6 \cdot \text{Time effects}_i + \varepsilon_i \quad \text{if Fund}_i = 0 \quad (2)$$

A related outcome is the percent of the funding total reached by projects that received some donations but were not fully funded:

$$\text{Percent funded}_i = \beta_1 \cdot \text{Log price}_i + \beta_2 \cdot \text{Project cost}_i + \beta_3 \cdot \text{Project characteristics}_i + \beta_4 \cdot \text{School characteristics}_i + \beta_5 \cdot \text{Teacher characteristics}_i + \beta_6 \cdot \text{Time effects}_i + \varepsilon_i \quad \text{if Fund}_i = 0 \text{ and Any donations}_i = 1 \quad (3)$$

These outcomes, however, do not directly address the crucial metric: the elasticity of giving with respect to the efficiency price. It is not immediately clear how to estimate this elasticity. One possibility is to consider a censored model. Each project has an associated underlying latent distribution of preferences of individual donors. If these preferences exceed a particular threshold, the project generates positive donations; if the latent desire to give exceeds a second threshold, the project

[14] An alternative is to consider each donors' choice of project to which to donate. However, with nearly a million donors and 400,000 projects, this approach is impractical. Moreover, there is limited information on donors, so there is little advantage over the aggregated data.

[15] Including year–month interactions does not greatly affect the results.

[16] For instance, some teachers can tap broader social networks to support their projects; this will be subsumed into the teacher fixed effects. Other unobservable attributes might include the sort of photographs chosen by the teacher (for an example of this type of effect, see Jenq et al. (2012)).

Table 2
Funding.

	Specification	*N*	Log of price of giving
Probability of funding	(1) OLS	371,906	−0.358*** (0.0168)
	(2) Teacher fixed effects		−0.338*** (0.0233)
Probability of any funding conditional on not funded	(3) OLS	113,651	−0.0148 (0.0381)
	(4) Teacher fixed effects		0.00601 (0.0668)
Percent funded conditional on some but not complete Funding	(5) OLS	55,355	−0.0421** (0.0162)
	(6) Teacher fixed effects		−0.0482 (0.0357)

Estimates include the variables described under project, school, and teacher characteristics in Table A1, as well as month and year effects, state indicators, and the log of total project cost.

achieves its funding goal. For example:

$$\text{Donations}_i^* = \beta_1 \cdot \text{Log price}_i + \beta_2 \cdot \text{Project cost}_i + \beta_3 \cdot \text{Project characteristics}_i + \beta_4 \cdot \text{School characteristics}_i + \beta_5 \cdot \text{Teacher characteristics}_i + \beta_6 \cdot \text{Time effects}_i + \varepsilon_i \quad (4)$$

$$\text{Donations}_i = \begin{cases} 0 & \text{if Donations}_i^* \leq 0 \\ \text{Donations}_i^* & \text{if Donations}_i^* > 0 \text{ and Donations}_i^* \leq \text{Total cost}_i \\ \text{Total cost}_i & \text{if Donations}_i^* \geq \text{Total cost}_i \end{cases} \quad (5)$$

This model can be estimated using a Tobit with both a lower and upper censoring limit. An alternative is to separately model the decision of whether or not a project receives any gifts (as in Eq. (2)), the amount it accrues if it receives any gifts but is not fully funded (a version of Eq. (3) that uses amount instead of percent), and the probability that the project is fully funded (as in Eq. (1)). These three components can be combined to find the expected value of donations; it is straightforward to calculate the elasticity of total giving with respect to the price, similar to the more standard hurdle model approach commonly used in the charitable giving literature (e.g. Huck and Rasul (2011) and Meer (2011)).

Finally, each of these specifications can be modified by adding the competition variables described earlier, thus measuring the effect of the presence of other projects.

5. Results

5.1. Probability and percentage of funding

As stated above, a natural place to begin is with the effect of the price of giving on the probability of funding. Row (1) in Table 2 shows that a ten percent increase in the price of giving reduces the likelihood of funding by about 3.6 percentage points; this effect is statistically significant.[17] It is important to note that a ten percent change in the price of giving is relatively large in this case; it is somewhat more than one standard deviation.

Results for the other variables, available on request, are shown in Table A2 of the Online Appendix. However, there are no significant differences in likelihood of funding between male and female teachers (as proxied by their salutation), while teachers who are members of Teach for America or New York Teaching Fellows are more likely to have their projects funded. Urban, charter, and high-poverty schools are more likely to be funded, as are projects affecting students in grades 9 through 12. Projects that were ever eligible for matching from a corporate or foundation sponsor (even if they were not necessarily matched) are significantly more likely to be funded.

As discussed above, one concern is that unobserved characteristics of the school or teacher are correlated with both the price of giving and the likelihood of funding. The results in Row (2) show that this is not the case. Adding teacher fixed effects for the 148,723 teachers in the sample changes the coefficient on the price of giving from −0.358 to −0.338.

We turn to the probability of receiving any funding, conditional on not being funded; 48.7 percent of unfunded projects received at least some donations. These results, in Rows (4) and (5), indicate that the price of giving does not have an effect on this probability. The coefficients are small and statistically insignificant.

Having seen that the price of giving affects the likelihood of achieving the funding goal, but not whether the project receives any donors, we next examine the effect of the price of giving on the percent of total funding received by unfunded projects, conditional on receiving any funding. The result in Row (6) indicates that a price of giving that is 10 percent higher reduces the percentage of funding received by an incomplete project by 0.4 percentage points, ceteris paribus. The coefficient

[17] For ease of comparison with the fixed-effects models, this specification is run with ordinary least squares. Results from a probit model, available on request, do not differ greatly from the linear probability model.

Table 3
Price elasticity of giving.

	Specification	*N*	Log of price of giving
Tobit	(1) Full sample	371,701	−0.781*** (0.0916)
	(2) No partner gifts	371,700	−1.075*** (0.103)
	(3) Cash gifts only	371,699	−1.714*** (0.115)
Hurdle model	(4) Full sample	371,701	−0.951*** (0.0938)
	(5) No partner gifts		−1.155*** (0.0967)
	(6) Cash gifts only		−1.747*** (0.110)

Estimates include the variables described under project, school, and teacher characteristics in Table A1, as well as month and year effects, state indicators, and the log of total project cost.

is statistically significant in this specification. However, adding teacher fixed effects increases the standard error, so that while the coefficient is similar in magnitude to Row (7), it is no longer statistically significant.

5.2. Total amount given

The most important metric on this topic is, of course, the price elasticity of giving, which shows how the actual amount raised by a charity is affected by its efficiency price. As previously discussed, it is not entirely clear how to approach calculating this elasticity. Therefore, the results in Table 3 present two sets of results: one calculated using a Tobit model, and the other using a two-sided hurdle model, in which the probability of receiving any donations, the amount given conditional on receiving some donations but not reaching full funding, and the probability of reaching full funding are estimated separately. These estimates are then combined to extract the elasticity of giving with respect to price.[18] Furthermore, the set of gifts being considered is restricted across the three rows for each econometric model. In Rows (1) and (4), the full set of gifts are used, while in Rows (2) and (5), gifts from foundation and corporate partners are excluded; Rows (3) and (6) use only gifts made using the most salient payment methods. The results do not differ greatly between the Tobit and hurdle models, but it is evident that the elasticity of giving is greater when the gift set is restricted. This is unsurprising, since individuals donating their own money at the immediate point of giving are most likely to be sensitive to the efficiency price.[19]

As discussed in Section 3, estimates of the elasticity of giving with respect to the efficiency price are likely to be upper bounds on the tax price elasticity of giving. We discuss the implications of this finding further in Section 6.

5.3. Competition

A natural complementary question to the effect of the price of giving is the effect of competition and, in particular, the effect of the price of *other* similar projects. To address this question, we supplement each of the models in Tables 2 and 3 with the log of the mean price of other similar projects which were active while the project was live. These results, in Table 4, show the importance of competition and emphasize that projects on DonorsChoose.org are close substitutes. With the exception of the percent funded conditional on some but incomplete funding, the effect of other projects' prices tend to be large and positive. For instance, a 10 percent increase in the average price of similar projects increases the likelihood that a project is funded by 6.1 percentage points. It is important to note that the distribution of mean prices for other projects is much tighter; thus, a 10 percent increase in mean price is the equivalent of moving from the 50th to the 75th percentile of the distribution. The other-price elasticities of giving are large and positive in Rows (4) through (6), ranging fairly widely depending on the specification, from about 1.9 to 3.8. These large effects of other prices suggest that donors are shifting their giving toward more "efficient" projects and provide further evidence of the importance of the price of giving on donative behavior.

To directly test the effect of additional competitors, these specifications also include indicator variables for the quintile representing the average number of projects with the subject area and in the same state across the days in which the project was live.[20] The excluded variable is the bottom quintile, with the fewest competitors. More competition, however,

[18] While the vast majority of projects are under one thousand dollars, the effects of donations to a few extremely large projects may affect the results. The results are qualitatively unchanged when the top one percent of projects (in terms of size) are dropped, though the coefficients are somewhat larger in magnitude.

[19] We can examine heterogeneity of sensitivity to the price of giving in several other ways. For example, in-state donors may be less responsive to this price, since they are more likely to have a personal relationship with the teacher posting the project (see Meer et al. (2013) or Agrawal et al. (2011) for discussions of social distance and geography in crowdfunding). To examine this question, we take the ratio of donations coming from the same state as the project to the total amount of donations for which the donors' state is available (approximately three-fourths of the sample). A ten percent increase in the price of giving increases the proportion of gifts coming from the same state by about two percentage points (on a baseline of about 69 percent), providing support for the notion that in-state donors are less price sensitive. In a similar vein, by interacting the price of giving with the poverty level of the school, we find that donations to high-poverty schools are somewhat less sensitive to overhead costs.

[20] Results are qualitatively similar when the competition variable is entered linearly, with a quadratic, in logs, or with a different number of categories. Further, when the price of giving is entered as a ratio of the project's own price to that of the competition group, the general pattern of results holds.

Table 4
Competition: number and price of other projects.

	N	Log of price of giving	Log mean price	Number of other projects			
				Quintile 2	Quintile 3	Quintile 4	Quintile 5
(1) Probability of funding (OLS)	342,458	−0.404*** (0.0179)	0.614*** (0.0507)	−0.0186*** (0.00306)	−0.0337*** (0.00374)	−0.0431*** (0.00471)	−0.0532*** (0.00597)
(2) Probability of any funding conditional on not funded (OLS)	105,131	−0.172*** (0.0408)	0.842*** (0.105)	−0.00078 (0.00618)	−0.0129* (0.00762)	−0.00477 (0.00951)	0.00026 (0.0121)
(3) Percent funded conditional on some but not complete funding (OLS)	50,920	−0.0227 (0.0172)	−0.141** (0.0450)	0.00660** (0.00259)	0.0118*** (0.00329)	0.0133** (0.00412)	0.0182** (0.00535)
(4) Elasticity of giving (tobit, full sample)	342,356	−1.257*** (0.0959)	3.271*** (0.253)	−0.0902*** (0.0142)	−0.173*** (0.0176)	−0.216*** (0.0226)	−0.267*** (0.0292)
(5) Elasticity of giving (tobit, no foundation)	342,355	−1.486*** (0.109)	1.855*** (0.290)	−0.145*** (0.0160)	−0.373*** (0.0199)	−0.504*** (0.0255)	−0.532*** (0.0330)
(6) Elasticity of giving (tobit, cash gifts)	342,354	−1.991*** (0.123)	2.405*** (0.330)	−0.206*** (0.0191)	−0.422*** (0.0234)	−0.588*** (0.0295)	−0.643*** (0.0377)
(7) Elasticity of giving (hurdle, full sample)	342,356	−1.490*** (0.0981)	3.834*** (0.259)	−0.113*** (0.0228)	−0.228*** (0.0281)	−0.279*** (0.0352)	−0.327*** (0.0444)
(8) Elasticity of giving (hurdle, no foundation)		−1.677*** (0.102)	3.101*** (0.272)	−0.161*** (0.0198)	−0.368*** (0.0234)	−0.478*** (0.0293)	−0.521*** (0.0370)
(9) Elasticity of giving (hurdle, cash gifts)		−2.100*** (0.117)	3.251*** (0.312)	−0.162*** (0.0182)	−0.303*** (0.0217)	−0.398*** (0.0266)	−0.455*** (0.0332)

Estimates include the variables described under project, school, and teacher characteristics in Table A1, as well as month and year effects, state indicators, and the log of total project cost.

has a substantial negative effect on the probability of being funded, decreasing from −1.9 percentage points for the second quintile to −5.3 percentage points for the most competitive quintile, as might be expected. The coefficient for each category is significantly different from that of the previous. Moreover, results from models including school or teacher fixed effects, available on request, have similar results; if anything, the coefficients show a steeper and stronger decline in the likelihood of funding in the presence of more competition. Interestingly, competition has little effect on the probability of receiving any funding, conditional on not being funded, while it seems to increase the percent of fund received by projects with some but incomplete funding.[21]

Turning to the total amount given, in Rows (4) through (9), we see strong negative effects of competition; this is unsurprising given the effects seen in Rows (1) through (3). For instance, in Row (4), the effect of being in the most competitive quintile of projects results in giving that is 23.4 percent lower.[22] The results are consistent across specifications and, indeed, larger. The more competition a project faces, the less it draws in donations.

6. Conclusions

This paper uses data from DonorsChoose.org to estimate the effect of efficiency prices on giving. We find large effects on both the probability of a project reaching its goal and on the elasticity of giving, with the latter generally greater than −1 in absolute value. We also find strong effects of competition, with large and positive cross-price elasticities and negative effects of additional similar charities. These findings suggest that efficiency prices play a large role in giving and that competition plays an important role in the market for donations.

As discussed above, these findings are an upper bound on the tax price elasticity of giving. While many researchers have found elasticities smaller than those found in this paper, an examination of the studies discussed in Peloza and Steel's (2005) thorough meta-analysis finds that a number of estimates are well above −2 in absolute value. As such, these findings provide a useful guide for what are likely to be more reasonable estimates.

Future research should focus on explicitly testing both the tax and efficiency prices of giving. Data limitations seem to be stymieing a direct approach to this question; one requires a panel with both donors' marginal tax rates (and itemizing status) along with the recipients of their giving. Further, the evidence on the role of competition deserves additional study.

Appendix A. Supplementary data

Supplementary data associated with this article can be found, in the online version, at http://dx.doi.org/10.1016/j.jebo.2014.04.010.

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[21] The significance of these latter results is sensitive to the inclusion of school and teacher fixed effects, and the selected nature of that particular sample makes it difficult to draw any conclusions.

[22] Since the outcome variable is in logs, the effect can be found by taking $e^{\beta} - 1$. In this case, $e^{-0.267} - 1 = -0.234$.

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